I
VOLUME

Nidana Prakasha

A Textbook of

ROGA Nidana & VIKRITI Vigyan

- With Clinical Explanation • MCQ[illegible]
- Previous Year Questions an[illegible] Papers

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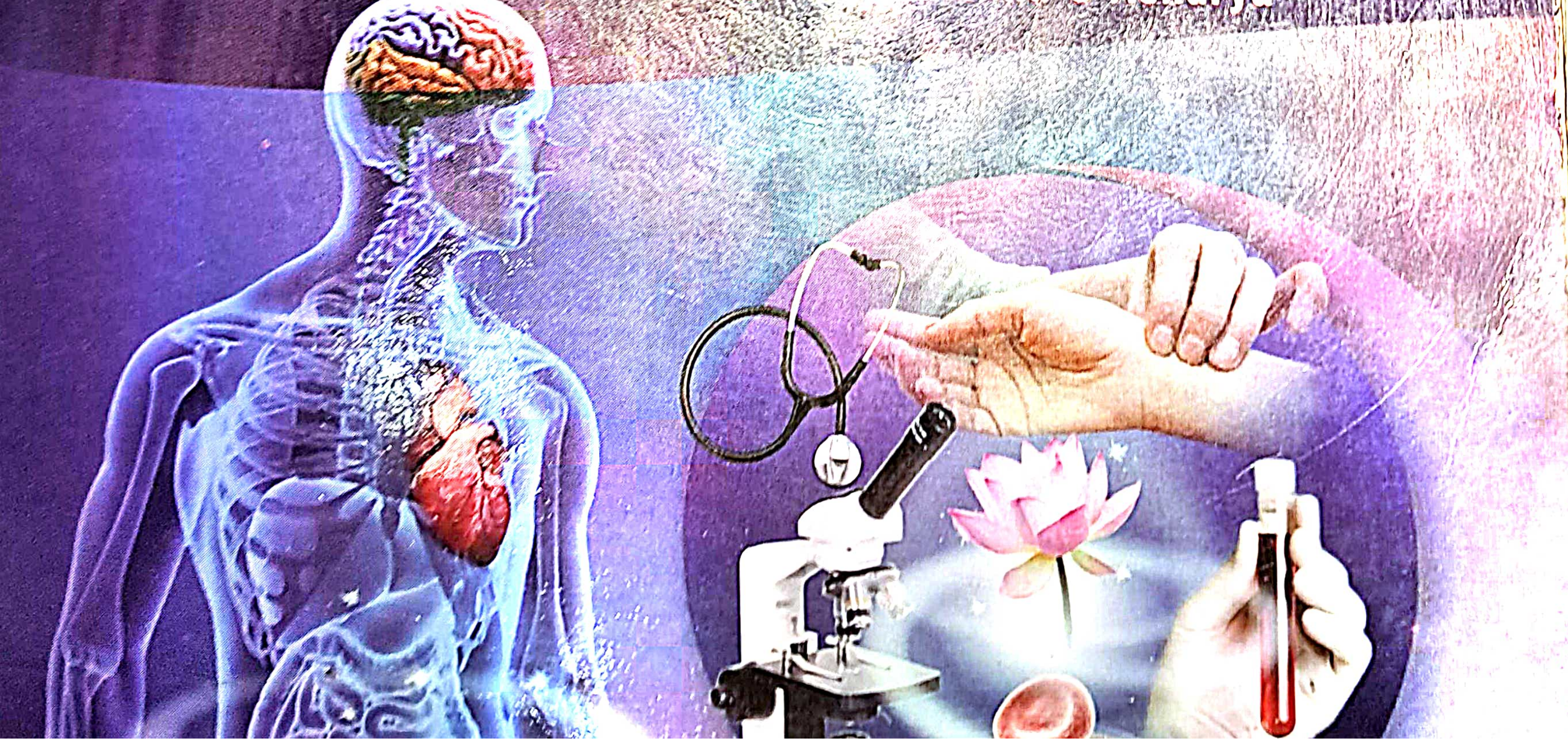

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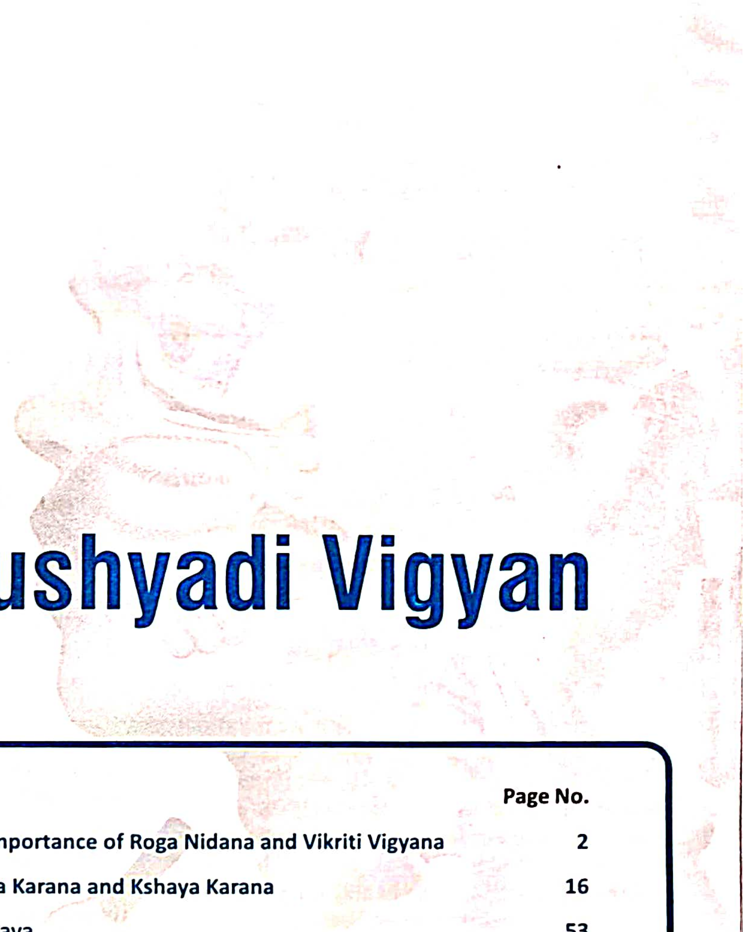
SECTION - I

Dosha Dushyadi Vigyan



With G.K.'s Opinion

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1

Definition and Importance of Roga Nidana and Vikriti Vigyana

Learning objective of this chapter

- ⇨ The meaning of Roga, Nidana, Vikriti and Vigyana
- ⇨ The significance of Roga Nidana and Vikriti Vigyana in the Vyadhi Vinischaya or diagnosis of a disease
- ⇨ The brief information about the appropriate method of evaluation of the disease based on the principles of Ayurveda
- ⇨ The appropriate method to do the examination of the patient accurately – a brief bird view
- ⇨ The knowledge of Sadhyasadhyata or prognosis of any disease in general as well as in particular disease
- ⇨ The knowledge regarding any complications which may occur due to existing disease or due to adverse reactions to any ongoing medications – brief review
- ⇨ The scope, extent of Roga Nidana and Vikriti Vigyana in current practice

दोषधातुमला मूलं सदा देहस्य A.Hr.Su. – 11/1

World Health Organisation (WHO) defines health as physical, mental and social well-being and not merely the absence of disease or infirmity. *Ayurveda* states health as proportional existence, harmony among *Dosha* (bioenergy), *Dhatu* (body tissues), Agni (digestive fire), *Mala* (excretory products) and proper functioning of mental faculties. Maintaining the healthy state is very delicate issue. Even, a minor irritating substance can lead to disturbed functioning of the components of the living beings. It should be kept in mind that such disturbances among the components of the body may not occur in a single day most of the occasions. Several days to months and in some cases, several years are necessary to show the abnormal functioning of the body. This may affect a single individual (in case of *Pakshaghata* or cerebro vascular accident) or group of individuals (in case of epidemic outbreaks). Careful analysis of the fundamentals of *Roga Nidana* and *Vikriti Vigyana* can help the clinicians to check the pathogenesis happening inside the ailing individuals and to give exact education regarding the nature of the illness, natural history of the disease and predict the exact life span of the individual and thus helping the community in combating against the disease and measures to prevent it.

As per *Ashtanga Hridaya*, the main pillars or roots of body are *Dosha* (bioenergy), *Dhatu* (body tissue) and *Mala* (excretory products). That is why we need to give more stress on the understanding of these pillars because any imbalance among these will lead to different clinical presentations. For example, when a person is having increase in *Vata Dosha* in *Pakvashaya* (large intestine), the person may be presented with either *Ruk* (pain in the lower abdomen) or *Vibandha* (constipation) or *Udavarta* (upward movement of *Vata*). If the person is showing the increase of *Vata Dosha* in the skin, he may have dryness of the skin. If the person is having the increase in *Rakta Dhatu* in the *Tvak* (skin), he may be presented with *Kushtha* (any skin disease), *Pidaka* (boils), *Vidradhi* (abscess) etc. That is why, it is of prime importance to know the clinical aspects of *Dosha*, *Dhatu* and Mala and to apply the same in the diagnosis of the disease in suffering individuals. We will relearn the information on the *Dosha*, *Dhatu* and *Mala* in brief.

Dosha

शरीरदूषणाद्दोषा Sha.Pu. – 5/24

Dosha are those substances which will maintain the human body. If due to any reason, they get vitiated, they are responsible for the manifestation of the disease in the human body as well as mind.

As per *Sushruta*, *Vata* is derived from **तत्र 'वा' गतिगन्धनयोरिति धातु** Su.Su. – 21/5, which means the term *Vata* is derived from two different meanings *Gati* and *Gandhana*. The term *Gati* has three different meanings – *Jnana* (knowledge), *Gamana* (movement) and *Prapti* (attainment) and *Gandhana* refers to perception of smell. In other words, *Gati* has a broader meaning of motor activity and *Gandhana* has a meaning of sensory activity. Thus, any kind of activity happening inside the body either sensor or motor is categorised under the broad heading of *Vata Dosha*.

The term *Pitta* is derived from **'तप' सन्तापे** Su.Su. – 21/5. This word means the one which is responsible for the generation of heat or burning sensation. That means any kind of activity related to digestion, assimilation and process of elimination of metabolites categorised under the broad category of *Pitta Dosha*.

The term *Kapha* is derived from **'श्लिष' आलिङ्गने**, Su.Su. – 21/5. This word means the one which is responsible for the compactness of the body. That refers to any kind of activity related to anabolism is categorised under the broad umbrella of *Kapha Dosha*.

The above said activities can be analysed even inside the cells too. For example, the movement of nutrients and metabolites inside the cells is related to *Vata Dosha*, the metabolic activities occurring inside the cells is related to the *Pitta Dosha* and anabolic activity such as formation of outer cell membrane can be attributed to the function of *Kapha Dosha*.

रजस्तमश्च मनसौ दोषौ।
तयोर्विकाराः कामक्रोधलोभमोहेर्ष्यामानमदशोकचित्तोद्वेगभयहर्षादयः।
वातपित्तश्लेष्माणस्तु खलु शारीरा दोषाः।
तेषामपि च विकारा ज्वरातीसारशोफशोपश्वासमेहकुष्ठादयः। च.वि. - 6/5

Further, *Doshas* are of two categories, *Sharirika Dosha* (bioenergies in relation to functioning of the body) and *Manasika Dosha* (bioenergies in relation to the functioning of the mind). *Sharirika Dosha* are *Vata*, *Pitta* and *Kapha Dosha*. Imbalance in the proportions of these bodily bioenergies will lead to different clinical manifestations for example, the presence of *Jvara* (fever) implying the increase of *Pitta*, *Atisara* (passage of semisolid or liquid stools or diarrhoea) indicating the increase of *Vata*, *Shopha* (localised or generalised swelling) suggesting the enhancement of *Kapha*, *Shosha* (extreme emaciation of the body) showing the increase of *Vata*, *Shvasa* (group of disorders associated with breathlessness) illustrating the increase of dual *Dosha* increase i.e. *Vata* and *Kapha*, *Meha* (set of diseases associated with the passage of increased frequency of urine and turbid urine) confirming the increase of *Kapha Dosha*, *Kushtha* (any skin disease) displaying the upsurge of *Tridosha* in the body etc. *Rajas* and *Tamas* are mental bioenergies. Imbalance among these bionenergies may result in *Kama* (lust or excess or intense desire) showing the proliferation of *Rajo Dosha*, *Krodha* (anger) illustrating intensification of *Rajo Dosha*, *Lobha* (greed) displaying the rise of *Rajo Dosha*, *Moha* (confusion) demonstrating the escalation of *Tamo Dosha*, *Irshya* (jealousy), *Mana* (pride or ego), *Shoka* (grief), *Cittodvega* (anxiety), *Bhaya* (fear), *Harsha* (happiness) all are showing the pathlogical increase of *Rajo Dosha* in the body etc.

ते च विकाराः परस्परमनुवर्तमानाः कदाचिदनुबध्नन्ति कामादयो ज्वरादयश्च॥8॥ Ca.Vi. – 6/8

These *Sharirika* and *Manasika Dosha* can vitiate among themselves. In other words, *Sharirika Dosha* can vitiate *Manasika Dosha* and vice versa. The following table shows the relation of *Mahabhuta*, *Triguna* and *Tridosha* in the body.

गुरुता चेति।
तत्रसत्वबहुलमाकाशं,रजोबहुलोवायुः,सत्वरजोबहुलोऽग्नि,
सत्वतमोबहुला आपः, तमोबहुला पृथिवीति॥1 9॥

Su.Sha. – 1/19

Table 1.1: Relationship between Mahabhuta, Guna dominance and Dosha

Mahabhuta	Guna dominance	Dosha
Prithvi	Tamo Guna	Kapha
Ap	Tama + Satva Guna	Kapha
Tejas	Rajas + Satva Guna	Pitta
Vayu	Rajas	Vata
Akasha	Satva	Vata

By the above table, we can infer the inter relation between *Sharirika Dosha* and *Manasika Dosha* and their relation with *Panchamahabhuta*. For example, if the person is going to consume the substances having *Prithvi Guna* dominant, then it is likely to responsible for the vitiation of *Tamo Dosha* among *Manasika Dosha* or *Kapha Dosha* among *Sharirika Dosha* or both.

Dhatu

धातवो देहधारणात्। Sha.Pu. – 5/24

व्साद्रक्तं ततो मांसं मांसान्मेदस्ततोऽस्थि च।
अस्थ्नो मज्जा ततः शुक्रं शुक्राद्नर्भः प्रसादजः॥1 6॥

Ca.Ci. – 15/16

Dhatus are those which will nourish and sustain the living bodies. *Dhatus* are seven in number. They are *Rasa* (fluid portion of the body except RBCs), *Rakta* (Red blood cells), *Mamsa* (muscular tissue), *Medas* (adipose tissue), *Asthi* (bone tissue), *Majja* (bone marrow) and *Shukra* (semen or reproductive tissue) in the order of their formation in the body.

रसात् स्तन्यं ततो रक्तमसृजः कण्डराः सिराः।
मांसाद्वसा त्वचः षट् च मेदसः स्नायुसंभवः॥1 7॥

Ca.Su. – 15/17

स्तन्यं रजश्च नारीणां काले भवति गच्छति।
शुद्धमांसभवः स्नेहः सा वसा परिकीर्तिका॥1 6॥
स्वेदोदन्तास्तथा केशास्तथैवोजश्च सप्तमम्।
इति धातुभवा ज्ञेया एते सप्तोपधातवः॥1 7॥

Sha. Pu. – 5/16,17

Table 1.2: Relation between Dhatu and Upadhatu

S. No.	Dhatu in the order of formation	Upadhatu formation as per Dhatu
1.	Rasa Dhatu	Stanya (breast milk) and Artava (menstrual blood) which will appear and disappear as depending upon the puerperium and menopause
2.	Rakta Dhatu	Kandara (tendons) and Sira (blood vessels)
3.	Mamsa Dhatu	Vasa (fatty material) and Shat Tvacha (six layers of Tvak)
4.	Medo Dhatu	Snayu (ligaments) and Sandhi (joints) and Sveda (as per Sharangadhara)
5.	Asthi Dhatu	Danta (teeth) as per Sharangadhara
6.	Majja Dhatu	Kesha (hairs)
7.	Shukra Dhatu	Ojas (essence of all Dhatu)

Mala

मलिनीकरणान्मलाः। Sha.Pu. – 5/24

Mala are those substances which will pollute when present in the body in excess. In other words, these are highly toxic to the body.

किट्टमन्नस्य विण्मूत्रं, रसस्य तु कफोऽसृजः।
पित्तं, मांसस्य खमला, मलः स्वेदस्तु मेदसः॥1 8॥
स्यात्किट्टं केशलोमास्थ्नो, मज्ज्ञः स्नेहोऽक्षिविट् त्वचां
प्रसादकिट्टे धातूनां पाकादेवंविधर्च्छ्तः॥1 9॥

Ca.Ci. – 15/18-19

Any deviation in the *Dosha, Dhatu* and *Mala* in terms of *Dravya* (quantity), *Guna* (quality) and *Karma* (functions), lead to the manifestation of either single or multiple diseases. For example, when 30 years old individual is presented with increased frequency of loose stools upto 20 times per day from past 2 days, the person may presented with *Mutra Kshaya, Rasa Kshaya* and *Vata Vriddhi* in the suffering individual.

Table 1.3: Dhatu and Dhatumala

S. No.	Source of Mala	Mala (excretory products)
1.	Ahara (ingested food)	Vit (faecal matter) and Mutra (urine)
2.	Rasa Dhatu	Kapha
3.	Rakta Dhatu	Pitta
4.	Mamsa Dhatu	Kha Mala
5.	Medo Dhatu	Sveda
6.	Asthi Dhatu	Kesha, Loma
7.	Majja Dhatu	Akshi Sneha (unctuous material of eyes), Vit (unctuous material of faecal matter) and Tvak (unctuous material of skin)
8.	Shukra Dhatu	Ojas (as per Sharangadhara)

Definition of the terms Roga Nidana and Vikriti Vigyana

Roga

रोगशब्देन रुजाकतृत्वम्। चक्र. च.नि. 1/5

रोगस्तु दोषवैषम्यं दोषसाम्यमरोगता॥ अ.हृ.सू. 1/

As per *Ashtanga Hridaya*, the term *Roga* refers to the imbalance in the proportions of *Dosha*.

Literally, the word '*Roga*' refers to any kind of pain or discomfort which will be observed in the diseased people. *Roga* is derived from the term '*Ruk*' or '*Ruja*'. Though the term implies pain in any part of the body or whole body, contextually, the term refers to any kind of discomfort observed in the diseased individuals.

- ⇨ It may be either physical such as *Udara Utsedha* (abdominal swelling) or *Sula* (pain) or *Kasa* (cough) or *Swasa* (breathing discomfort) or itching in *Kushtha* (discolouration of skin) or swelling and redness of short duration in *Visarpa* (skin manifestations with fast spreading nature) or *Karmahani* (reduced or complete loss of function of any part of the body) or any of mental disturbances such as *Soka* (grief), *Krodha* (anger) or *Bhaya* (fear) or *Matsarya* (jealousy) or *Lobha* (greed) etc.
- ⇨ The *Ruja* may be either trivial such as *Aruchi* (tastelessness) or severe such as *Visamjnata* (altered state of consciousness). By above descriptions, it is clear that *Ruja* may be either physical (*Saririka*) or mental (*Manasika*) or both; it may be either localised (*Sthanika*) such as *Gridhrasi* (pain in one or both lower limbs) or *Granthi* (cystic swelling) or *Vrana* (ulcer) or *Sarvadaihika* (generalised) such as *Jvara* (raised body temperature) or *Panduvarna* (yellowish white discolouration all over the body). *Ruja* may also be due to the endogenous cause (*Nija*) such as *Jvara* (raised body temperature) or exogenous cause (*Agantuja*) such as *Vrana* (ulcer) due to trauma with sharp weapons or wild animals or as a natural phenomenon such as *Kshudha* (hunger), *Trisna* (thirst) or *Jara* (aging) etc.
- ⇨ All the descriptions which are described in the texts are having the significance in diagnosing the disease, deciding the *Sadhyasadhyata* (prognosis), planning the treatment and *Pathyapathya* (diet and measures to be followed or avoided during the consumption of medicine and after the stoppage of medicine). The detailed description of *Roga* and factors responsible for the mechanism of manifestation of disease will be given in the coming pages.

Further, the diagnosis of any disease indicates the involvement of a particular *Srotas* or multiple *Srotas*. Abnormality of the *Srotas* can be manifested due to four folds of pathological processes namely, *Atipravritti* (excessive movement of vitiated *Dosha* in its natural course), *Sanga* (stagnation of vitiated *Dosha* in a particular place), *Vimargagamana* (movement of vitiated *Dosha* in different channels other than its normal course) and *Siragranthi* (abnormal swelling).

The presence of *Jwara* indicates the involvement of *Rasavaha Srotas*; the presence of *Kasa* or *Swasa* implies the involvement of *Pranavaha Srotas* and *Rasavaha Srotas*; the presence of *Udara Utsedha* suggests the involvement of *Annavaha Srotas*, *Udakavaha Srotas* mainly and involvement of *Raktavaha Srotas* depending on the presenting complaints in due course of time. Apart from the *Srotas* involvement, one can easily identify the type of *Srotodushti* in case of thorough enquiry. The presenting complaint of *Chardi* (vomiting) indicates that the individual is having *Annavaha Srotodushti* with *Sanga* and *Vimargagamana* as *Srotodushti Prakara*. The presenting complaint of *Ati Drava Malapravritti* (stools with semi solid consistency and increased volume) is suggestive of involvement of *Purishavaha Srotas* with *Atipravritti* as *Srotodushti Prakara*. If the person is presenting with the complaints of *Sirayama* (tortuosity of veins), suggestive of the involvement of *Raktavaha Srotas* with *Siragranthi* as a type of *Srotodushti*. If the person is presenting with huge, hard abdominal swelling rapid enlargement of the swelling, suggestive of the involvement of *Mamsavaha Srotas* with *Siragranthi* as a type of *Srotodushti*. Thus, the knowledge of involvement of *Srotas* and the nature of *Srotodushti* helps us in determining the exact pathological events taking place inside the body and thereby deciding the exact line of treatment as mentioned in literatures. The details will be incorporated in coming pages.

Thus, one has to know the process of manifestation of disease from the contact of *Nidana* (aetiological factor) with the person till the complete manifestation of the disease. Apart from *Nidana* and *Roga*, there are other factors which will help in thorough understanding of disease. They are *Purvarupa* (prodromal symptoms), *Rupa* (clinical features), *Samprapti* (pathogenesis of the disease), *Pariksha* (examination of the individual by the physician) etc.

Nidana

निर्दिश्यतें व्याधिरनेंन इति निदानम्।। (मधु. मा.नि. 1/-)

The term '*Nidana*' has to different meanings – diagnostic methods and causative factors. In this context *Nidana* refers to the methods which will be helpful to determine the type of disease or stage of the disease, the patient is suffering from. For example, if the person is suffering from either *Kushtha* or *Visarpa*, the methodical examination of *Twak* is essential. If the person is suffering from *Swasa* or *Kasa*, methodical examination of *Pranavaha Srotas* is necessary. If the person is suffering from *Udara Utsedha*, detailed examination of the *Annavaha Srotas* and *Pranavaha Srotas*, *Purishavaha Srotas* to a lesser extent is necessary. Apart from the examination of the patient, identification of *Nidana*, *Purvarupa*, *Rupa* and *Samprapti* are also contributing in the diagnosis of the disease.

For example, if a physician gets three individuals having the habit of cigarette smoking (*Dhuma Sevana*) with different time intervals, the person who has the habit of cigarette smoking of short duration will have minimum *Ruksha Guna* increase and the person who has habit of *Dhuma Sevana* of longer duration he may have *Ruksha Guna* increase to the maximum extent when compared to the former one and another person will have medium increase of *Rukshna Guna*. Along with *Ruksha Guna*, there may be the possibility of increase of *Laghu* or *Ushna Guna* depending on the type of *Nidana*. The manifestation of the disease in this example is determined by *Prakriti* of the individual, status of the *Dosha*, *Dushya*, involvement of *Srotas* etc. If we scan the textbooks, we get the scattered references here and there regarding the methods of examination. Therefore, an attempt is being made to gather these scattered references in one book, so that the interpretation of the principles of examination and diagnosis of diseases based on fundamentals of *Ayurveda* can be made without much difficulty.

Vikriti

विकृतिरुच्यतें विकार:......।। च.वि. 8/103
विकारो धातुवैषम्यं, साम्यं प्रकृतिरुच्यतें।। च.सू. 9/
............................विकारो दुःखमेंव च। च.सू. 9/

The term '*Vikriti*' refers to *Vikara*. Any kind of imbalance of *Dosha*, *Dhatu* and *Mala* is considered as *Vikara*. Another reference suggests that the *Vikara* is nothing but any discomfort happening inside the patient's body. As the *Dosha* are not observed thorugh naked eyes, their abnormalities are known by the abnormal functions taking place in the body. The assessment of *Dosha* is difficult in the understanding of the disease through laboratory parameters. It is also said that disease is the outcome of conglomeration of *Dosha* and *Dushya* in a particular location. The assessment of *Vikriti* can be done by thorough examination of *Dhatu* and *Mala* as these are visible through naked eyes. This part of study was in primitive stage in ancient era of Ayurveda. Certain methods such as *Taila Bindu Pariksha*, *Mala Pariksha* to assess *Samatva* and *Niramatva* of *Purisha* were frequently practiced in those days. As per the present literatures of *Ayurveda*, the word '*Vikriti*' means the method of examination of different body tissues or elements such as *Mutra*, *Purisha*, *Rakta*, *Nishthiva* (sputum).

Vigyana

The *Vigyana* refers to *Vishesha Jnana* i.e. specialised knowledge. Thus *Roga Nidana* and *Vikriti Vigyana* refers to the specialised knowledge regarding the method of interrogation of the patient, method of examination of the patient, method of diagnosis, method of differential diagnosis, method of predicting the prognosis, method of examination of different components of the body etc.

Concept of disease

If an attempt is being made to understand the definition of disease, several descriptions are available. Webster defines disease as 'a condition in which body health is impaired, a departure from a state of health, an alteration of the human interrupting the performance of vital functions'. Oxford dictionary defines disease as 'a condition of the body or some part or organ of the body in which its functions are disrupted or deranged'. From the ecological point of view, disease is a maladjustment of the human organism to the environment. From the sociological point of view, disease is a social phenomenon occurring in all societies and defined and fought in terms of the particular cultural forces prevalent in the society. Simplest definition of disease is just opposite of health. In other words, any deviation from normal functioning or state of complete physical and mental well being. WHO did not state any definition of disease as such.

From the point of biochemical aspect, every human being is having several biochemicals in the human body in different proportions. Each biochemical is supposed to be present in the human in specified proportions. If there is any disproportionate presence leading to the manifestation of the disease. For example, raised level of serum uric acid is confirmatory of the diagnosis of gout. Raised level of serum calcium is confirmatory of the diagnosis of parathyroidism. Elevated levels of glucose in the blood is pathognomonic of diabetes mellitus. Reduced levels of urea in the blood is suggestive of the hepatic pathology.

When a person is exposed to etiological factors, due to the pathological changes occurring inside the body, some will show symptoms immediately and in some other individuals, there will be delayed development of symptoms and in some patients, the symptoms will not be shown and the patient will be in carrier state.

- ⇨ **Latent disease:** this is nothing but subclinical disease, that means the disease is not clinical identifiable for example, in the patient absence of chest discomfort in the patient of rheumatic fever or pericarditis or absence of abdominal pain in the patient of typhoid or absence of the yellowish discolouration of the eyes in the patient of haemolytic jaundice etc.
- ⇨ **Paroxysmal disease:** This type of disease pattern can be observed in the patients in the form of episodes or attacks or paroxysms

which are separated by intervals of comparative health. Such diseases usually begin abruptly having sudden onset of the disease followed by full blown symptoms, further followed by sudden or gradual decline of the symptoms. For example, ischemic heart disease, epilepsy, syncope, bronchial asthma and transient ischemic attack.

The end point or outcome of disease is variable– recovery from the illness with or without signs of recovery, temporary or permanent disability or death of the individual.

Three different terminologies are used to describe the abnormal functions in the human body in western medicine.

⇨ **Disease** – physiological or psychological dysfunction

⇨ **Illness** – subjective state of the person who feels aware of not being well

⇨ **Sickness** – a state of social dysfunction

Whenever a patient visits the physician, first of all, one has to make an attempt to make an accurate diagnosis. The process of accurate diagnosis includes complete case history, methodical clinical examination and appropriate laboratory investigation. This should be followed by appropriate line of treatment. If the clinician starts to give the treatment without considering status of the disease and if appropriate cure of the disease happens, then the success of the clinician can be due to chance. Therefore, the clinician having ample knowledge regarding medications and knowledge regarding *Desha* (in terms of the place of birth, disease causation, growth of medicinal drugs etc) and *Kala* (in terms of season, manifestation of the disease) should analyse accurately regarding the different parameters of the disease manifestation and give the treatment accordingly. Then only, the success can be attributable to the clinician.

Importance of Roga Nidana in Ayurveda

The clinical significance of morphological and functional changes together with results of other laboratory investigations, imaging techniques help the clinician to arrive at an answer to what is wrong (diagnosis) happening inside of the human body, what will going to happen in coming days (prognosis), how to prevent the outcome of such abnormal functioning (management) and what can be done to avoid the manifestation of disease, its complication and measures to check the spread of the disease (prevention). Therefore, before giving any of the treatment, knowledge of the *Roga Nidana* and *Vikriti Vigyana* is beneficial.

प्रयोजनं चास्य स्वस्थस्य स्वास्थ्यरक्षणमातुरस्य
विकारप्रशमनं च॥26॥ Ca.Su. – 30/26

Main aims of *Ayurveda* as per *Charaka* are maintaining the health of healthy individuals and alleviating the sufferings of suffering individuals. The same description is also supported by *Sushruta* in his textbook. In the above descriptions, we have discussed the meaning of *Vikara* or *Roga*.

हेतुलिङ्गौषधज्ञानं स्वस्थातुरपरायणम्।
त्रिसूत्रं शाश्वतं पुण्यं बुबुधे यं पितामहः॥24॥
Ca.Su. – 1/24

It is being mentioned that fundamentals of *Ayurveda* are explained in three *Sutra* termed as *Trisutra Ayurveda*. They are *Hetu* (aetiological factors), *Linga* (clinical features) and *Aushadha* (drugs or treatment). That means two thirds of the fundamentals of *Ayurveda* coming under the purview of *Roga Nidana*. In most of the occasions, patients will visit the clinicians when they are suffering from the illness. Any illness is characterised by certain group of signs and symptoms. Based on the assessment of these signs and symptoms, we need to identify the actual cause of the disease with the help of *Rogi Pariksha* and *Roga Pariksha*.

रोगमादौ परीक्षेत ततोऽनन्तरमौषधम्।
ततः कर्म भिषक् पश्चाज्ज्ञानपूर्वं समाचरेत्॥20॥
यस्तु रोगमविज्ञाय कर्माण्यारभते भिषक्।
अप्यौषधविधानज्ञस्तस्य सिद्धिर्यदृच्छया॥21॥
यस्तु रोगविशेषज्ञः सर्वभैषज्यकोविदः।

देशकालप्रमाणज्ञस्तस्य सिद्धिरसंशयम्॥22॥
Ca.Su. – 20/20-22

⇨ Before giving any kind of treatment, one has to do identify the actual illness, an individual is suffering from and after that only, the physician has to give appropriate medications. Then only, the physician will be successful in curing the disease. Following factors can be decided after the proper diagnosis of the disease.

- ❑ The degree of vitiation of *Dosha* in the individual, association of other *Dosha* involved in the pathogenesis
- ❑ The involvement of *Dhatu* and *Mala* in the disease process
- ❑ The involvement of *Srotas* in the manifestation of the disease
- ❑ The nature of pathophysiology happening in the diseased individual
- ❑ The *Rogamarga* afflicted in the individual – *Bahya* or *Madhyama* or *Abhyantara* or two *Rogamarga* or all three *Rogamarga*
- ❑ The presence of *Ama* in the body, whether is it in *Koshtha* or is it in different location?
- ❑ Identifying the exact *Nidana* in the manifestation of the disease
- ❑ By looking into the above informations, the physician can determine the exact medicine in appropriate dose and appropriate time for specified time period along with appropriate *Anupana*.

⇨ If the person is giving the medicine without making the appropriate diagnosis of the disease, then the person may not respond to the medicines or even if he responds that may not be judged by physician and he cannot predict the prognosis of the disease.

⇨ That is the reason, the physician should be skilled in the examination of the patient, thereby analysing the exact status of imbalance in the body. The physician should also have the adequate knowledge of the ingredients of the different medications, appropriate knowledge of the *Desha* (place of the individual and place of the drug) and *Kala* (status of the ill health in the diseased individual and time of administration of medicine).

भिषजा प्राक् परीक्ष्यैवं विकाराणां स्वलक्षणम्।
पश्चात्कर्मसमारम्भः कार्यः साध्येषु धीमता॥21॥
साध्यासाध्यविभागज्ञो यः सम्यक्प्रतिपत्तिमान्।
न स मैत्रेयतुल्यानां मिथ्याबुद्धिं प्रकल्पयेत्॥22॥
Ca.Su. – 10/21-22

A physician should know to examine any disease by its features and later one has to plan the treatment on the basis of its curability and incurability. If the clinician does the thorough analysis of the *Vikara* and plan the treatment accordingly, then the clinician will become a successful clinician.

नास्ति रोगो विना दोषैर्यस्मात्तस्माद्विचक्षणः।
अनुक्तमपि दोषाणां लिङ्गैर्व्याधिमुपाचरेत्॥19॥
Su.Su. – 35/19

A disease will not manifest without the involvement of *Doshas*. The disease will be present based on the nature of abnormality of *Dosha*. Further, *Dosha Vaishamya* is manifested in the form of *Lakshana*. A complete knowledge of the subject of *Roga Nidana* and *Vikriti Vigyana* will be helpful in determining the nature of abnormality of *Dosha*, type of the *Dosha* vitiated, the quality of *Dosha* responsible for the clinical manifestation, the site of the body showing abnormal functions etc, thereby thorough knowledge of the disease can be attained and later leading to the appropriate line of treatment.

Further, it is being said that a wise clinician should start giving treatment only when he gets a complete knowledge of the disease by means of *Roga Pariksha* and *Rogi Pariksha*. Further, it is also being said that the manifestation of *Roga* is nothing but the imbalance in the proportions of the *Dosha* observed in the body. Imbalance of the *Dosha* is being described in several terms namely *Vriddha Dosha*, *Kupita Dosha*, *Kshina Dosha*, *Lina Dosha*, *Stambhita Dosha*.

Vriddha Dosha refers to bioenergy which is abnormally increased in the body. This increase can happen in any part of the body. Whereas *Kupita Dosha* is the bioenergy which is abnormally increased *Dosha* in the *Koshtha* (alimentary canal). In other words to say, *Kupita Dosha* is the initial stage of the disease manifestation and *Vriddha Dosha* stage is progressive stage of the disease manifestation. *Kshina Dosha* refers to the abnormally decreased *Dosha* in the body. It means that *Kshina Dosha* will be responsible for the increase of other *Dosha* in the body. For example, if there is decrease of *Vata Dosha*, there will be the increase of *Kapha Dosha* thus *Kshina Dosha* is indirectly responsible for the vitiation of other *Dosha* in the body.

The term *Lina Dosha* refers to the situation of vitiated *Dosha* in dormant level. That means the *Dosha* in this situation is not responsible for the manifestation of any identifiable symptoms. When conducive environment for the further vitiation of *Dosha* occurs, then the symptoms can be seen in the body.

खृत्स्नेऽर्धेऽवयवे वापि यत्राङ्गे कुपितो भृशम्।।
दोषो विकारं नभसि मेघवत्तत्र वर्षति।।29।।
नात्यर्थे कुपितश्चापि लीनो मार्गेषु तिष्ठति।।
निष्प्रत्यनीकः कालेन हेतुमासाद्य कुप्यति।।30।।

Su.Su. – 21/29-30

तत्रस्थाश्च विलम्बन्ते कदाचिन्न समीरिताः।
नादेशकाले कुप्यन्ति भूयो हेतुप्रतीक्षिणः।।32।।

Ca.Su. – 28/32

For example, in a person who is known case of *Tamaka Shvasa* (bronchial asthma) asymptomatic, when exposed to dust developing the episode of *Tamaka Shvasa*, then it can be inferred that it was the stage of *Lina Dosha* when the person is asymptomatic.

The term *Stambhita Dosha* refers to the *Dosha* in the stagnant stage or immobile stage. this can happen in alimentary canal and in part of the body. This means that there will not be Pachana Karma in the body.

शीतं मन्दं मृदु श्लक्ष्णं रूक्षं सूक्ष्मं द्रवं स्थिरम्।
यद्द्रव्यं लघु चोद्दिष्टं प्रायस्तत् स्तम्भनं स्मृतम्।।17।।

Ca.Su. – 22/17

The properties of *Stambhana Dravya* are *Shita* (cold), *Manda* (slow in motion or action), *Mridu* (softness), *Shakshna* (smooth), *Ruksha* (dry), *Sukshma* (minute), *Drava* (liquid in consistency), *Sthira* (firm in consistency), *Laghu* (light to digest). If one or more of the above said qualities present in *Stambhita Dosha* are responsible for the stagnant stage of vitiated *Dosha*.

स्तभ्यन्ते न विपच्यन्ते कुर्वन्ति विषमज्वरम्।।161।।
दोषा बद्धाः कषायेण स्तम्भित्वात्तरुणे ज्वरे।।

Ca.Ci. – 3/162

It is further stated that in the patients who is suffering from *Taruna Jvara* (fever of recent onset), and they consume the *Kashaya Rasa* (astringent taste), the person will suffer from *Vishama Jvara* because of the *Stambhana* property of *Kashaya Rasa*.

Apart from the understanding of Dosha, we have to learn

- **Concept of *Dhatu*** (body tissues), *Mala* (excretory products), abnormalities developed during the abnormal proportions of *Dhatu* and *Mala*, this will be learnt in the context of *Dhatu* and *Mala*.
- **Concept of Srotas**, understanding of *Khavaigunya* (minor abnormality in the channel) and *Srotodushti* (major abnormality in the channel), this will be learnt in the context of description of *Srotas*.
- **Concept of *Agni*** (digestive fire), *Agnidushti* (abnormalities in digestion) including the causes of *Agni Dushti*, mechanism of *Agni Dushti* and outcome of *Agni Dushti*
- **Concept of Ama** (residue present in alimentary canal or in body tissues after impaired digestion), mechanism of formation of *Ama*, symptoms of presence of *Ama* in the body, symptoms of *Saamata* and *Niramatva* in the body of *Dosha*, *Dhatu* and *Purisha*
- **Concept of *Rogamarga*** (extent of the presence of morbid *Dosha* in the body), anatomical, pathological and clinical understanding of *Rogamarga*

- **Concept of *Doshagati*** (state of *Dosha* vitiation in the body), learning in detail about the various stage of *Dosha* in the body, its utility in the treatment of disease
- **Concept of *Nidana Panchaka*** *Nidana* (aetiological factors), *Purvarupa* (prodromal symptoms), *Rupa* (clinical features), *Upashaya* (therapeutic tests) and *Samprapti* (pathogenesis) and its application in the present era
- **Concept of *Kriyakala*** (identifying the actual state of *Dosha* in the diseased individual), understanding of *Chaya Purvaka* and *Achaya Purvaka Prakopa*, *Dosha Lakshana* and *Vyadhi Lakshana*, mechanism of *Dosha Dushya Sammurchana*, manifestation of *Upadrava* and *Arishta* during the stage of *Kriyakala*
- **Concept of *Avarana*** (obstruction in the channels), understanding of *Avaraka* and *Avrita* and their application
- **Concept of *Vyadhi*** (disease) and *Vyadhi Vargikarana* (classification of diseases), learning the application of classification of the disease
- **Concept of *Pariksha*** (means of examination described in various classical texts), learning different types of *Pariksha* and their application
- **Concept of *Arishta*** (signs of imminent death), various ways of identifying *Arishta Lakshana*
- **Concept of *Vyadhyavastha*** (state of the disease process in the diseased individual), its utility in predicting the prognosis and planning the line of treatment
- **Concept of *Sadhyasadhyata*** (curability and incurability of an illness), learning to apply in case of unidentified disease in *Ayurvedic* literatures

Significance of study of Roga Nidana and Vikriti Vigyana in the present era

Contextual meaning of *Roga Nidana* refers to the clinical methods adopted to diagnose a disease and *Vikriti Vigyana* refers to the methods to diagnose the disease with the help of laboratory investigations and other imaging techniques by which one can able to identify the nature of the abnormality in any *Dhatu* or *Mala*.

- It is being said in literatures that manifestation of the disease is the outcome of abnormal proportions of *Dosha*. Abnormal proportions may be in the form of either increased state or decreased state of the *Dosha* in the body. Decreased state of the *Dosha* in the body is not responsible for the manifestation of disease as such, that will be responsible for the increase of other *Dosha* in the body. For example, excess passage of loose stools from the body is responsible for the decrease of *Kapha Dosha*, but it is the increase of *Vata Dosha* in the body is responsible for various abnormal functions. The abnormal state of the body can be assessed by *Anumana* (inference). The reasons for the inference to be the main criteria to decide the abnormal *Dosha* are as follows:

वैलक्षण्यात् शरीराणामस्थायित्वात्तथैव च।
दोषधातुमलानां तु परिमाणं न विद्यते।।43।।

Su.Su. – 15/43

- **Uniqueness of the individuals (*Shariram Vailakshanya*)**: The individuals are showing unique features.
  - The ***Prakriti*** of different individuals are unique. Colour of body, scalp hair, colour of the skin etc are different depending upon the dominance of the *Dosha*. Shveta (whitish colour) colour is suggestive of *Kapha Prakriti* of the individual. *Krishna* (blackish colour) *Varna* of the body is suggestive of *Vata Prakriti* of the individual. *Kapisha* (colour resembles skin of the monkey) *Varna* of an individual imply the *Pitta Prakriti*.
  - The ***Sara*** of an individual is unique. Because of the intake of certain food substances such as foods kept in the

refrigerator or consumption of the cold substances soon after the consumption of hot substances etc have an impact on the Sara of the body. Apart from food substances, the nature of work place also decides the Sara of the individual. Therefore, the Sara may be different proportionately depending upon the quality and quantity of exposure to etiological factors.

- *Samhanana* of the individuals is different depending upon the nature of the strenuous work, intake of the food substances etc. The people who are working as agriculturist or the people who work as hard manual labourer will be having the strong *Samhanana*. The people who are not having strenuous work or who have sedentary lifestyle such as people working in front of computers or in jewellery shops will have weak *Samhanana*.
- Some people may have ***Dirgha Sharira*** (tall stature), some other may have *Hrsva Sharira* (short stature), some other may have *Sthula Sharira* (hefty body) and some other may have lean body. Because of the varied physical appearances, varied exposure to etiological factors, wide range of appearances of abnormal *Dosha* and *Dushya* function etc, the wise clinician has to analyse the abnormal *Dosha* looking into each and every detail of the individuals who are suffering from illnesses.

⇨ The normal proportion of the *Dosha* is highly unstable. This is because of the variations in the strength of the individuals as well as varied exposure to wide range of causative factors. The unstability of *Dosha* are due to two types of *Kala* – *Nityaga* and *Avasthika Kala*.

- Based on *Nityaga kala*, *Kapha Dosha* will be dominant in morning, *Pitta Dosha* in midnoon and *Vata Dosha* in the evening time. *Kapha Dosha Sanchaya* is observed in *Hemanta Ritu*, *Vata Dosha Sanchaya* in *Grishma Ritu* and *Pitta Dosha Sanchaya* in *Sharat Ritu*.
- As far as *Avasthika Kala* is concerned, *Kapha Dosha* dominance is seen in childhood, *Pitta Dosha* dominance in middle aged people and *Vata Dosha* dominance is observed in elderly people.
- The knowledge of *Roga Nidana* will be helpful in distinguishing *Guru Vyadhita* and *Laghu Vyadhita* individuals. Guru *Vyadhita* refers to the individuals who show the clinical features of severe disease, but in fact they are suffering from mild illness. The term *Laghu Vyadhita* refers to the individuals show the clinical features of mild illness, actually they will be suffering from very serious disease. Such kind of clinical presentation is due to weak and strong *Satvabala* respectively. A clinician who is new to the field of clinical medicine, may falter in accurate diagnosis of the disease.
- The study of *Roga Nidana* will be helpful in assessing the severity of the disease (*Rogabala*). The criteria for the assessment of the *Rogabala* are manifolds such as duration of intake of *Nidana*, involvement of *Dosha Prakopa* and *Dhatu* involvement, involvement of *Srotas*, presence of *Ama*, assessment of Agni and *Koshtha* etc, frequency and duration of the Sula in the patient suffering from. This type of information is essential to frame the Samprapti *Ghataka*, so that the appropriate measures are taken for the alleviation of the sufferings of the patient. If the person is having *Vatavyadhi*, and if the person is having the *Ruksha Bhojana* for a shorter duration is likely to have faster recovery when compared with the individual who has habit of *Ruksha Bhojana* for longer duration. If the person is having affliction of one *Srotas* has speedy recovery when compared to that the individual who has affliction of multiple *Srotas*.
- The *Rogibala* can be predicted with the help of *Rogi Pariksha*. For example, extent of *Antrakujana* (gurgling sound in the abdomen) in the patient suffering from *Atisara* (frequent passage of liquid to semiliquid stools), extent of *Udara Utsedha* (globular swelling of abdominal region) in the patient suffering from *Udara*, extent of rapid spread of disease in *Tvak* in *Visarpa*, Sula in the *Hridaya* (chest) region in patient suffering from *Hrit Sula*, *Suchivat Vedana* (pricking type of pain like needle) in the patient who is having the excess fluid loss from the body in *Visuchika*. If one *analyse* the *Lakshana*, it can be further classified either *Sthanika* (localised) or *Sarvadaihika* (generalised) *Lakshana*. In most of the occasions, if the person is having *Sthanika Lakshana*, it can be easily manageable and if the person shows *Sarvadaihika Lakshana*, such features can be managed with much difficulty.
- The life span of the patient can be predicted by appropriate physical examination. If the person is suffering from any major disease or injury related to *Basti*, *Hridaya* and *Siras*, that person may survive for the maximum of 7 days. A separate section of *Indriya Sthana* is explained in *Caraka Samhita* regarding the life span of different individuals showing different *Aristhta Lakshana* (signs of imminent death).
- There are other necessary informations helpful in the clinical diagnosis as per *Ayurveda*. To mention a few are concept of *Rogamarga*, concept of *Sadhyasadhyata*, *Janapadodhwamsa*, *Vyadhi vargikarana*, concept of *Ama*, concept of *Arishta*, concept of *Satmya* and *Asatmya*, concept of *Viruddha Ahara* etc.
- If the person is suffering from any disease related to *Bahya Rogamarga*, the *Doshas* should be brought to Koshtha by appropriate *Purvakarma* and *Samshodhana Karma*. If the person is suffering from disease related to *Abhyantara Srotas*, this type of *Purvakarma* may not be necessary prior to *Sodhana* therapy as *Doshas* already situated in *Koshtha*. If the person is suffering from any disease related to *Madhyama Rogamarga*, such diseases are comparatively difficult to cure as several sittings of *Samshodhana* therapy may be necessary.
- As far as the concept of *Ama* is concerned, the physician should identify any features in the patient which may indicate the presence of *Ama*. If there is presence of *Ama*, which part of the body is showing features of *Ama* in the *Koshtha* or in the *Shakha*. Is it possible to identify the severity of the *Ama* in the body? After the assessment of *Ama*, one should get rid off *Ama* by giving the appropriate *Dipana* and *Pachana* therapy. *Samshodhana* therapy should be planned only after the disappearance of *Samavastha stage*. If one try to administer the *Samshodhana* therapy in *Sama* stage, there may be a possibility of severe complications like extraction of juice from unripe mango.
- The informations on *Doshas* will be helpful in determining the actual causative factors so that avoidance of *Nidana* consumption may help speedy recovery. In the practice of *Ayurveda*, the clinicians are giving less stress on the elicitation of *Nidana* and its impact on the *Dushya* and functions of the body. This is the reason why *Ayurveda* clinicians are having ignorance in the management of the diseased individuals based on fundamentals of *Ayurveda*.

- Several types of disease classifications will be helpful in the proper planning and deciding the prognosis of the disease in patients. For example, if the person is suffering from *Kushtha*, it is generally difficult to treat by nature, as it is considered as *Tridosha Pradhana Vikara*. This disease is classified under *Adibala Pravritta Vikara*, *Adhyatmika Vikara*, *Saririka Vikara* in different set of classifications of the disease. *Jara* (ageing) is considered under *SvabhavabalaPravrittaVikara*, *Adhidaivika Vikara*. This is very difficult to cure, but prolongation of *Jara* is possible by adopting appropriate *Rasayana* therapy. This type of categorisation is essential for the proper management of the disease. Detailed classification of *Vikara* or diseases will be discussed in coming pages.
- The significance of *Asraya* and *Asrayi Bhava* is known when the physician is having the doubt regarding the *Dosha* vitiated and *Dushya* involved in general. As per *Ayurveda*, based on *Asraya* and *Asrayi Bhava*, *Asthi* is related to *Vata*, *Rakta* and *Sveda* is related to *Pitta* and rest of the *Dushyas*, namely *Rasa, Mamsa, Meda, Majja, Sukra, Mutra, Purisha* are related to *Kapha Dosha*. This type of knowledge is helpful in case of *Anukta Vikara* (disease which is not being recognised or named). Another important aspect is the treatment in case of *Vata* and *Asthi* involvement i.e. if the person is suffering from *Vata Prakopa*, there will be *Asthi Kshaya* and vice versa. In such situation, during the state of abnormal increase of *Vata Dosha*, *Santarpana* (nourishing therapy) is essential which is also responsible for the increase of *Asthi* in the body and *Apatarpana* (depleting therapy) line of treatment is preferred in case of decrease of *Vata Dosha* in the body which is also responsible for the decrease of *Asthi* in the body.
- As far as the concept of *Viruddha Ahara* is concerned, most of the diet patterns practiced nowadays is one or the other ways acts as *Viruddha* to the human body. For example, consumption of fish and milk together is considered to be *Virya Viruddha*. Fish and milk are having *Madhura Rasa*, *Guru* and *Snigdha Guna*, *Madhura Vipaka*, but fish is having *Ushna Virya* and milk is having *Sita Virya*. That means consumption of both fish and milk together may be responsible for *Shandhya* (unable to produce progeny), *Kilasa* (a type of skin disease characterised by whitish discolouration) and *Kushtha* (any type of skin disease) etc diseases.
- The examination of *Agni* and *Koshtha* is essential in the diagnosis of the disease and treatment. Examination of Agni is helpful in assessment of metabolic functions of the body and examination of the *Koshtha* is helpful in assessment of excretory function of the alimentary canal. In case of *Nija Vikaras*, the functions of *Agni* and *Koshtha* are deranged as *Dosha Utpatti* (production of *Dosha* during *Ahara*) happens in *Mahasrotas* only. If the functions of *Agni* and *Koshtha* are corrected by adopting *Dipana* and *Pachana*, *Shodhana* and *Pathya*, the faster recovery from the illness will be likely.
- As far as *Upadrava* (complication) is concerned, most of the *Purvarupa* (prodromal symptoms), *Rupa* (clinical features) and *Upadrava* (complications) are usually manifested in the same *Srotas* involvement or any other *Srotas* which has close contact with the *Srotas* affected in any individual. *Upadrava* may be mild (*Anu*) or major (*Sthula*). For example, in case of *Atisara*, if the person is suffering from *Vibandha* (*Purishavaha Srotas* involvement) initially, may develop the *Dravamala Pravritti* (*Purishavaha Srotas* involvement).

Chapter Resources

1. WHO website
2. Park's textbook of preventive and social medicine
3. *Charaka Samhita*, *Sushruta Samhita* and *Ashtanga Hridaya* excerpts

Probable questions to be asked in the examination Long essay questions

1. Define *Roga Nidana* and *Vikriti Vigyana*? How the information of *Prakriti Vigyana* will be helpful in determining the *Vikriti* .of an individual?
2. What is *Roga Nidana* and *Vikriti Vigyana*? Discuss the importance of *Roga Nidana* and *Vikriti Vigyana*?
3. Define *Roga Nidana* and *Vikriti Vigyana*? What is the importance of *Roga Nidana* and *Vikriti Vigyana*?
4. Discuss the importance of *Roga Nidana* and *Vikriti Vigyana* in present era with suitable examples

Short essays and short answers questions

1. Define *Roga Nidana* and *Vikriti Vigyana*
2. Explain the importance of *Roga Nidana* with two suitable examples

***

Dosha Prakopaka Karana and Kshaya Karana

2

Learning objective of this chapter

- ➪ If you learn these informations, then it is very easy to the physician to make the suffering individuals to avoid the etiological factors. As per *Susruta*, avoiding the etiological factors is the main line of the management.
- ➪ Easy to educate the patient regarding his nature of illness, clinical features and thus educating the people
- ➪ Easy to assess the *Sadhyasadhyata* of any illness
- ➪ It is easy to plan the management.

In previous classes, we have learnt that *Doshas* are the substances present in the body which have the tendency to vitiate or pollute the part of the body or whole body when they get conducive environment, otherwise these are responsible for the maintenance of health in the human body. *Doshas* are considered as invisible and their existence is predicted based on the physiological functions happening inside the body.

In textbooks of *Ayurveda*, several factors are mentioned which may lead to the increase or decrease of the *Dosha* in the body. Either the single etiological factor or multiple etiological factors are responsible for these abnormalities among the *Dosha*. These abnormalities can be known by various *Lakshana*. These *Lakshana* indicate the increase or decrease of one or many *Gunas* (quality) of the *Dosha*. For example, *Vata Dosha* can be increased by either *Ruksha* (dry), *Laghu* (light to digest), *Sita* (cold), *Khara* or *Chala* (unstable or mobile) *Guna*, either one *Guna* or multiple *Gunas*. It may be of worth mentioning here that for the diagnosis of any *Vyadhi* (disease), this assessment of *Guna* (quality) is one among the method to analyse the abnormality of *Dosha*. For instance, the *Dosha Pradhanyata* (dominance of *Dosha* in a disease) can be understood by the *Balakala Samprapti*, *Pradhanya Samprapti*. The same can be applied while discussing the abnormal proportions of *Pitta* and *Kapha Dosha* also. The description of *Samprapti* etc can be looked into the appropriate chapters. This chapter discusses the various causative factors responsible for the vitiation of *Dosha*.

Etiological factors and alleviating factors of *Dosha* in relation to *Shadrasayukta Ahara* (food substances having six *Rasas*):

तत्राद्या मारुतं घ्नन्ति त्रयस्तिक्तादयः कफम्॥
कषायतिक्तमधुराः पित्तमन्ये तु कुर्वते॥

A.Hr.Su. – 1/15-16

तत्र दोषमेकैकं त्रयस्तयो रसा जनयन्ति, त्रयस्त्रयश्चोपशमन्ति।
तद्यथा - कटुतिक्तकषाया वातं जनयन्ति, मधुराम्लल वणास्त्वेनं शमयन्ति; कट्वम्ललवणाः पित्तं जनयन्ति, मधुरतिक्तकषायास्त्वेनच्छमयन्ति; मधुराम्ललवणाः श्लेष्माणं जनयन्ति, कटुतिक्तकषायास्त्वेनं शमयन्ति॥

Ca.Vi. – 1/6

Rationale behind the *Panchabhautika* composition and *Rasa* and relation with *Dosha*: This description is available in *Rasabhediya* chapter of *Ashtanga Hridaya*.

Table 2.1: Relationship between Rasa and Dosha

Dosha	Rasa increases Dosha	Rasa decreases Dosha
Vata	Kashaya (astringent), Tikta (bitter), Katu (pungent)	Madhura (sweet), Amla (sour), Lavana (salt)
Pitta	Katu (pungent), Amla (sour), Lavana (salt)	Kashaya (astringent), Tikta (bitter), Madhura (sweet)
Kapha	Madhura (sweet), Amla (sour), Lavana (salt)	Katu (pungent), Tikta (bitter), Kashaya (astringent)

Table 2.2: Relation between Rasa, Panchabhoutika composition, and their effect on variations of Dosha

Rasa	Panchamahabhuta dominance	Vitiation of Dosha	Diminution of Dosha
Madhura	Prithvi + Ap	Kapha	Pitta and Vata
Amla	Agni + Prithvi	Pitta and Kapha	Vata
Lavana	Ap + Agni	Pitta and Kapha	Vata
Tikta	Akasha + Vayu	Vata	Pitta and Kapha
Katu	Agni + Vayu	Vata and Pitta	Kapha
Kashaya	Prithvi + Vayu	Vata	Pitta and Kapha

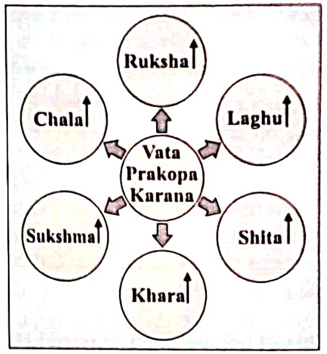

Chart 2.1: The effect of Vata Prakopa Karana on Gunas of Vata Dosha

Etiological factors of the vitiation of Vata Dosha

व्यायामादपतर्पणात् प्रपतनाद्भग्ङात् क्षयाज्जागरात् वेंगानां च विधारणादतिशुचः शैत्यादतित्रासतः।
रूक्षक्षोभकपायतिक्त कटुकैरेभिः प्रकोपं व्रजेत् वायुर्वारिधरागमे परिणते चान्नेऽपराह्नेऽपि च॥

(मा.नि. - 1/5, मधु)

Vyayama

शरीरायासजनन कर्म व्यायाम उच्यते।

A.Hr.Su. – 1/10, Arunadatta.

Vyayama[1] is considered to be the activities responsible for exhaustion or fatigue in the body.

Vyayama in this context refers to the excessive amount of exercise. If a person performs exercise beyond his capability, there will be vitiation of *Vata Dosha* in the body. At the time of performance of the *Vyayama*, there will be *Achayapurvaka Prakopa* (vitiation of *Vata* without *Chayavastha* or stage of accumulation). If a person indulges in *Vyayama*

GK

[1] When a person does exercise, there will be depletion of carbohydrate, fat and proteins respectively depending upon the availability of nutrients and degree of exercise. When one notice the depletion of proteins from the body, the person loses weight.
Due to the increase in functioning of muscles, there will be production of heat due to following mechanisms.
1. overcoming viscous resistance to the movement of the muscles, joints
2. overcoming the friction of the blood flowing through blood vessels

for longer duration, there will be *Chayapurvaka Prakopa* (vitiation of *Vata* followed by stage of accumulation of *Vata Dosha* inside the body).

The amount of exercise preferred by an individual on average is

अर्धशक्त्या निषेव्यस्तु। A.Hr.Su. – 2/11

The amount of the exercise[2] which is half of his physical strength, is considered to be adequate as far as the maintenance of the health is concerned.

Benefits of performing the exercise as per literatures

लाघवं कर्मसामर्थ्यं स्थैर्यं दुःखसहिष्णुता।
दोषक्षयोऽग्निवृद्धिश्च व्यायामादुपजायते॥

Ca.Su. – 7/32

As per *Caraka*, if adequate *Vyayama* is performed, is responsible for the *Diptagni* (increased digestive fire), *Laghava* (lightness of the body), *Karmasamarthya* (having the capacity to perform more activities), *Medas Kshaya* (depletion of fatty tissue).

लाघवं कर्मसामर्थ्यं दीप्तोऽग्निर्मेदसः क्षयः।
विभक्तघनगात्रत्वं व्यायामादुपजायते॥ A.Hr.Su. – 2/10

By this, it is evident that if we perform the *Vyayama* in excess, leads to *Apatarpana* (body depletion) effect, increase of *Laghu* (lightness) quality in particular.

तृष्णा क्षय प्रतमको रक्तपित्तं श्रमः क्लमः।
अतिव्यायामत कासो ज्वरच्छर्दिश्च जायते॥

A.Hr.Su. – 2/13

The ill effects of excess exercise from an individual will lead to *Trishna* (thirst), *Kshaya* (depletion of body tissues), *Pratamaka* (breathlessness), *Raktapitta* (bleeding disorders), *Shrama* (exhaustion), *Klama* (fatigue without doing any activities), *Kasa* (cough), *Jvara* (fever) and *Chardi* (vomiting).

Apatarpana– means the measures which lead to depletion of the body tissues. The measures such as fasting, excess walking, excess exposure to sunlight, running, swimming etc cause *Apatarpana* effect in the body. Initially, there will be depletion of carbohydrate followed by the depletion of fat in case of absence of carbohydrate and lastly there will be depletion of protein in the absence of carbohydrate and fat in the body. Thus, the person will show emaciation in the body.

चतुष्प्रकारा संशुद्धिः पिपासा मारुतातपौ।
पाचनान्युपवासश्च व्यायामश्चेति लङ्घनम्॥

Ca.Su. – 22/18

Prapatana – falling from height. The fall from height is responsible for severe pain and there will be fractures of bones also (*Bhagna*).

तत्र प्रसारणाकुञ्चनविववर्तनाक्षेपणाऽशक्तिप्ररुजत्वं
स्पर्शासहत्वं चेति सामान्यं सन्धिमुक्तलक्षणमुक्तम्।

Su.Ni. – 15/6

वाताहृते नास्ति रुजा। Su.Su. – 17/8

Ayurvedic literature says *Vata* is essential for the manifestation of pain. In case of *Bhagna*, there will be continuous and severe pain during the movement of the injured part associated with tenderness of the affected part. *Bhagna* may require prolonged immobilisation of the joint involved to have adequate recovery. Prolonged immobilisation results in disuse atrophy (*Mamsa Sosha*). In other words, there will be musculo skeletal injury which may range from simple ligamental injury or nerve injury to most complicated fractures. This kind of injury results in the limitation of movement of the limbs. In this situation, vitiation of *Vata* occurs due to the increase of *Laghu* and *Ruksha* qualities in the body.

Bhanga[3] – fractures.

तत्र प्रसारणाकुञ्चनविवर्तनाक्षेपणाऽशक्तिरुग्रहजत्वं
स्पर्शासहत्वं चेति सामान्यं सन्धिमुक्तलक्षणमुक्तम्।

Su.Ni. – 15/6

G K

[2] In a marathon race (running for a distance of 42.2 kms/ 26.2 miles), the metabolism of the body may increase to 2000% above normal metabolism at rest.

[3] Muscular spasm occurs in muscles that surround the broken bone. This leads to the pain impulses initiated from broken edges of bone. Periosteum is also containing large amount of pain receptors.

This type of injury to the body parts needs prolonged immobilisation responsible for disuse atrophy which may lead to the enhancement of *Laghu* and *Ruksha guna* in the body. Involvement of *Asthi Bhagnata* may lead to *Asthi Kshaya*, *Mamsa Kshaya* which indirectly gives the information of *Vata Vriddhi*. This particular concept is based on *Ashraya Ashrayi Bhava*. The concept of *Ashraya* and *Ashrayi Bhava* is discussed in coming pages.

Ksaya[4]– *Dhatu* and *Mala ksaya*. It is natural that any depletion of *Dhatu* or *Mala* is responsible for vitiation of *Vata Dosha*.

सद्यःक्षीणो हि सद्यो वै तर्पणेनोपचीयते।
नर्ते संतर्पणाभ्यासाच्चिरक्षीणस्तु पुष्यति॥
देहाग्निदोषभैषज्यमात्राकालानुवर्तिता।
कार्यमत्वरमाणेन भेषजं चिरदुर्बले॥ Ca.Su. – 23/31

This *Kshaya* may be of *Sadya* (recent onset) or *Chira* (gradual onset) [Ca.Su. – 23/31]. In both types of *Kshaya*, there will be vitiation of *Vata Dosha*. This phenomenon is seen in chronic debilitating illnesses and in the persons who are having enhanced frequency of defecation such as *Grahani* or *Atisara* and micturition such as *Prameha*.

Jagarana[5] – Here *Jagarana* refers to avoiding sleep at night time. As per *Charaka*, if the person indulges in this kind of activity results in increase of *Ruksha Guna* in the body.

रात्रौ जागरणं रूक्षं स्निग्धं प्रस्वपनं दिवा।
अरूक्षमनभिष्यन्दि त्वासीनप्रचलायितम्॥ Ca.Su. – 21/50

This is helpful to suggest the plan of the treatment i.e. *Snehana* therapy is not going to help the patient unless the person sleeps in day time following the loss of sleep. It is also being said that the person should go to sleep without taking the food during day time that too in the sitting posture not in recumbent posture (Ca. Su. – 21/31-43). The duration of sleep in day time should be half the amount of time of loss of sleep in night time.

Veganam ca vidharanat[6] - suppressing the natural urges in the body. *Vega Pravartana* is the main function of *Vata Dosha*. suppression of natural urges such as *Mutra*, *Purisha*, *Ashru* etc leads to the vitiation of *Vata Dosha* (A.Hr.Su. – 4/21, *Arunadatta* commentary).

रोगाः सर्वेऽपि जायन्ते वेगोदीरणधारणैः।

A.Hr.Su. – 4/21

अनुत्सर्गलक्षणानि, ते।
अत्रेय युक्तिवेगोदीरणधारण नाम वायो कर्म, तस्य क्रियावत्त्वात्।
तेन च वेगोदीरणधारणलक्षणेन स्वकर्मणा स एव वायु कोप्यते।
स कुपित सर्वानेव विकारान् जनयति।
तथा चोक्तम्।

(हृ.सू.अ. 19/85) A.Hr.Su. – 4/21, Arunadatta

Vitiated *Vata* due to these causes various diseases. If we speak about the suppression of *Purisa* and *Mutra*, that will lead to the vitiation of *Apana Vata*. Reverse movement of *Apana Vata* is responsible for the abnormal functioning

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G K

[4] Loss of water from all compartments of the body i.e. compartment of alimentary canal, intravascular compartment, interstitial compartment and intracellular compartment.
Probable causes of rapid dehydration:
1. Excessive sweating
2. Fluid loss in severe vomiting and diarrhoea
3. Excess loss of fluid by nephrotic kidneys
4. Inadequate intake of fluid and electrolytes
5. Destruction of adrenal cortex with loss of aldosterone function and consequent failure of kidneys to reabsorb sodium, chloride and water

[5] Prolonged wakefulness at night is often associated with progressive malfunction of thought processes and sometimes even causes abnormal behavioural activities. Irritability and even psychotic features can be observed in some patients.

[6] Let us take the example of v. Once a micturition reflex occurred and if it is not materialised, then nervous elements of this reflex usually remain in an inhibited state for a few minutes to 1 hour or more before another micturition reflex occurs. As the bladder becomes filled more and more, the micturition reflexes occur more and more powerful. This is responsible for pain in the lower abdomen.

of *Samana Vata* and *Prana Vata* too as the time passes.

Ati Shuchi[7] – excess *Shodhana* procedure – *Shodhana* also termed as *Samshodhana* comprises *Vamana* (emesis), *Virechana* (purgation), *Basti* (administration of medicines through rectal route), *Nasya* (administration of medicines through nasal route) are considered as *Langhana* therapies as per *Charaka*. Proper *Shodhana* therapy itself responsible for the depletion of the body tissues and excretory products (*Dhatu* and *Mala*). Increased *Shodhana* therapy results in further depletion of the body tissues and excretory products. Thus there will be vitiation of *Vata Dosha*.

चतुष्प्रकारा संशुद्धिः पिपासा मारुतातपौ।
पाचनान्युपवासश्च व्यायामश्चेति लङ्घनम्॥
Ca.Su. – 22/18

Shaitya – exposure to cold – this causes increase of *Sita guna* in the body. *Sita* is considered to be one of the main qualities of *Vata Dosha*. Therefore, excess exposure to cold such as living in cold climate will lead to the increase of *Sita* quality in the body and this increase of *Sita* lead to *Stambhana* (stiffness) of the body or body parts.

शीतं मन्दं मृदु श्लक्ष्णं रूक्षं सूक्ष्मं द्रवं स्थिरम्।
यद्रव्यं लघु चोद्दिष्टं प्रायस्तत् स्तम्भनं स्मृतम्॥
Ca.Su. – 22/17

Stambhana is considered to be abnormal function of vitiated *Vata Dosha*. For example, when a person is exposed to cold air in winter season or living in very cold air conditioned room, the person may develop breathing discomfort due to contraction of muscles of bronchi, the person will develop the episode of bronchial asthma.

Ati trasana[8] – As it is mentioned *Trasana* (creating the fear in the person) is one of the specific *Upakrama* of *Vata Dosha* as per *Vagbhata*. *Ati trasana* i.e. making the person fearful by various activities is responsible for excess *Vata Prakopa*.

कामशोकभयाद्वायुः, क्रोधात् पित्तं, त्रयो मलाः।
भूताभिषङ्गात् कुप्यन्ति भूतसामान्यलक्षणाः॥
Ca.Ci. – 3/115-116

This is being supported by *Charaka* as he states the vitiation of *Vata* occurs due to exposure to *Bhaya* (fear).

Ruksa – excess consumption of *Ruksa* or dry substances. This causes increase of *Ruksa guna* in the body.

रूक्षो हि गुणो वातगुणेषु प्रधानम्। Ca.Ni. – 1/19, Chakra
शोषणे रूक्ष A.Hr.Su. – 1/18, Hemadri

Ruksha Guna- is considered to be the main *Guna* of *Vata Dosha*. Therefore, if the person consumes the substances having *Ruksha Guna*[9] result in increase of *Shoshana* (dryness) in the body or body parts.

Kshobha– excess consumption of irritating substances[10] such as *Katu* (spicy substances), *Tikshna* (substance responsible for irritation in the body) is responsible for the vitiation of *Vata Dosa* as these substances are having *Laghu* (lightness) *Guna*, *Tikshna Guna*, *Ushna Guna* these substances will cause Shoshana (dryness) in the body.

Kasayatikta katu rasa– excess consumption of *kasaya* (astringent taste), *katu* (pungent taste)[11] and *tikta rasa* (bitter taste) substances. *Katu rasa* has the dominance of Agni and *Vayu Mahabhuta*; *Tikta rasa* has the dominance of *Akasha* and *Vayu Mahabhuta* and *Kashaya Rasa* has the dominance of *Prithvi* and *Vayu Mahabhuta*. Thus if the person consumes more substances having the dominance of *Kashaya*, *Katu* and *Tikta Rasa*, there will be vitiation of *Vata Dosha* certainly.

Varidharagama Kala– Rainy season (*Varsa Ritu*) is considered to be the natural season for the vitiation of *Vata Dosa*. *Anna Parinama kala* – after the complete digestion of food.

Aparahna Kala– afternoon. These are the diurnal or seasonal variations can be observed in the human body in relation to vitiation of *Vata Dosha*. But, the peculiarity of this set of causes is there will not be accumulation of the *Dosha*, as the time duration of exposure to etiological factors is very short. This is called as *Achayapurvaka Prakopa*.

The causative factors of Vata Dosha Prakopa (As per Sushruta)

अत ऊर्ध्वं प्रकोपणानि वक्ष्यामः।
तत्र बलवद्विग्रहातिव्यायामव्यवायाध्ययनप्रपतन-
प्रधावनप्रपीडनाभिघातलङ्घनप्लवनतरणरात्रिजागरण-
भारहरणगजतुरगरथपदातिचर्याकटुकषायतिक्तरूक्ष-
लघुशीतवीर्यशुष्कशाकवल्लूरवरकोद्दालककोरदूष-
श्यायामाकनीवारमुद्गमसूराढकीहरेणुकलायनिष्पावान-
शनविषमाशनाध्यशनवातमूत्रपुरीषशुक्रच्छर्दिक्षवथूद्गा-
रवाष्पवेगविघातादिभिर्विशेषैर्वायुः प्रकोपमापद्यते॥19॥
Su.Su. – 21/19

⇨ ***Balavad Vigraha*** – wrestling or fighting[12] with person who is having more strength by a weak individual.

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[7] This will lead to the state of dehydration in the body. Loss of fluid from all compartments of the body– intra vascular compartment, interstitial compartment and intracellular compartment is termed as dehydration.
Some of the causes which lead to hypovolemia due to above said phenomena are
1. Excessive sweating
2. Fluid loss in excess vomiting and diarrhoea
3. Excessive loss of fluid by nephrotic kidneys
4. Inadequate intake of fluids and electrolytes
5. Destruction of adrenal cortex, associated with loss of aldosterone function leading to failure of the kidneys to absorb sodium chloride and water.

Shodhana therapy is said to be responsible for the depletion of fluid from intravascular compartment, interstitial compartment and intracellular compartment sequentially. Thus, we can observe the vitiation of *Vata Dosha* in the patient who underwent purificatory therapy in excess.

[8] When the person is exposed to fear continuously, that will be responsible for the activation of sympathetic nervous system. The effects of sympathetic nervous system on different parts of the body are as follow:
1. Vasoconstriction and less secretion of nasal, lacrimal, parotid, submandibular, gastric and pancreatic glands
2. Excess production of sweat
3. Vaso constriction of blood vessels
4. Increased basal metabolic rate up to 100%
5. Lipolysis of fat cells in adipose tissues
6. Increased gluconeogenesis from skeletal muscles
7. Increased adrenal medullary secretion – epinephrine and nor epinephrine
8. Decreased urine formation from kidneys and retention of urine in case of distended bladder

Thus, when a person is frequently or continuously exposed to fear, this will lead to the depletion of body tissues in the long run.

[9] *Ruksha* quality is responsible for the dryness in the body. Suppose if a person consumes *Ruksha* substances, the alimentary tract requires more secretions to digest these *Ruksha* substances. More secretions from the gastro intestinal lumen will lead to the shift of the fluid from interstitial compartment to intravascular compartment. Thus, the person may develop dryness in the peripheral tissues. This phenomenon may take a long time.

[10] Irritating substances such as spicy substances are responsible for the inflammatory changes in the alimentary canal, thus more secretions will be occurring in the lumen, thereby leading to the shift of fluid from interstitial compartment to intravascular compartment and from intravascular compartment to gastro intestinal lumen.
Gastro intestinal lumen receives 9-10 liters of fluid everyday either from secretions of alimentary canal and through ingestion. When the person consumes irritating substances, this will increase the peristaltic movements, thereby more fluid loss occurs, thus leading to the hypovolemia. Thus, we can see the symptoms of vitiation of *Vata Dosha*.

[11] The term 'pungent' refers to the one which is having a sharply strong taste. It means to prick or sting. The mechanism of pathophysiology is similar to the irritating substances.

[12] While fighting or wrestling, two varieties of energy systems will be activated
1. Glycogen lactic acid system
2. Aerobic system

- ⇨ ***Ativyayama*** – excess exercise, is responsible for the vitiation of *Vata Dosha* in the body. Its explanation was explained earlier.
- ⇨ ***Ativyavaya***– excess sexual intercourse[13] is responsible for the depletion of *Dhatu*, thus is responsible for the vitiation of *Vata Dosha*.
- ⇨ ***Adhyayana*** – excess studying or learning[14]
- ⇨ ***Prapatana*** – falling from height. This is responsible for the either fracture of the bone or muscular or ligamental injury. This is responsible for the instant development of pain. It is being said that without *Vata* vitiation, there will be no pain. Thus, falling from height is responsible for the vitiation of *Vata*.
- ⇨ ***Pradhavana*** – running[15] for long distances. Running for long distances needs more

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We know that ATP (Adinosine tri phosphate) molecule is the energy source of the living body. In glycogen lactic acid system, ATP formation will be 2.5 times that of aerobic system. But in case of 3rd type of energy system i.e. phosphagen system, ATP formation will be 4 times than that of aerobic system.
If two people are having wrestling, then glycogen lactic acid system and aerobic system are coming into action depending upon the nutrition status of the people.
Under optimal conditions, glycogen lactic acid system can provide 1.3 to 1.6 minutes of maximum muscular activity, whereas phosphagen system will provide 8 to 10 seconds of maximum muscular activity.

[13] Male sexual function involves
1. Intact libido
2. Ability to achieve and maintain penile erection
3. Ejaculation and orgasm
4. Detumescence

Female sexual function involves
1. Intact libido
2. Sexual arousal due to environment and partner
3. Vaso congestion and lubrication of vagina and external genitalia
4. Orgasm

Increased sexual activity will be leading to the excitement of autonomic nervous system, when there is stimulation of sympathetic nervous system, there will be raise in the heart rate, pulse rate and increased breathing, enhancing the basal metabolic rate, thus we can infer the increase of *Vata Dosha* and *Pitta Dosha* in the body

[14] Studying or learning involves generation of several thought processes. A thought results from a pattern of stimulation of many parts of the nervous system at the same time. Each thought process involves simultaneous signals in many portions of cerebral cortex, thalamus, limbic system and upper reticular portion of brain stem. The qualities of thought process include pleasure, displeasure, pain, comfort, crude modalities of sensation, localisation to gross areas of the body. E.g. feeling of texture of silk or vegetable, visual recognition of oval pattern of cricket ball, specific localisation of sensation on the surface of the body such as feeling of presence of cloth etc.
Studying also influences on the memory. Physiologically, memories are stored in the brain by changing the basic sensitivity of synaptic transmission between neurons as a result of previous neuronal activity.
Under resting conditions, the metabolism of the brain accounts for 15% of the total metabolism of the body, even though the mass of brain is 2% of the total body mass. Therefore, under normal resting conditions, brain metabolism per unit of mass of tissue is about 7.5 times the average metabolism in non nervous system tissues. Under normal conditions, all the energy used by brain is derived from glucose from the blood and it is not dependent on insulin unlike other tissues of the body. Thus, excess studying is responsible for the increase in utilisation of glucose by the brain tissues. Thus, excess studying may lead to the depletion of the nutrient in the body, thereby we can indirectly infer the aggreviation of *Vata Dosha* in the body.

[15] Running for longer distances utilises the glycogen from the muscle. As far as restoration of muscular glycogen during exhaustion of muscle needs several days for replenishment of depleted glycogen from the muscles. This is a state of *Dhatukshaya* in the body. This is responsible for the increase of *Vata Dosha* in the body.

amount of energy. If the person runs for longer distances without any rest or taking any energy drink, it is likely to vitiate the *Vata Dosha* in the body.

- ⇨ ***Prapidana*** – vigorous massage, with much pressure on the body is responsible for muscular pain,[16] it is being said that the presence of pain suggests the vitiation of *Vata Dosha* in the body.
- ⇨ ***Abhighata*** – trauma[17] to any part of the body. Ca.Ni. – 1/30. In case of trauma, it is being said that there will be the vitiation of *Vata Dosha* and abnormal decrease of *Rakta* in the body.
- ⇨ ***Langhana*** – excess exposure to measures[18] which lead to lightness of the body. The explanation for this terminology is described earlier in this chapter.
- ⇨ ***Plavana*** – skipping and *Tarana* – excess swimming[19] are responsible for the vitiation of *Vata Dosha* by the effect of depletion of body tissues.
- ⇨ ***Ratri Jagarana*** – awakening at night time. This is responsible for the increase of *Ruksha Guna* in the body. The explanation is given earlier in the chapter.
- ⇨ ***Abhighata*** – lifting heavy weight.[20] It is one of the main reason for the development of pain in low back, i.e. *Gridhrasi*. As stated earlier, there will be no pain without the involvement of vitiated *Vata Dosha*.
- ⇨ ***Gaja, Turanga, Ratha and Pada Aticharya***– excess riding of elephant, horse,[21] chariot and excess walking
- ⇨ ***Katu, Tikta, Kashaya, Ruksha, Laghu and Shita Virya*** *substances* – will worsen the situation of *Vata Dosha* due to the *Samanya* principle.
- ⇨ ***Shushka Shaka***– dry vegetables[22] are

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[16] Muscular pain occurs mainly due to muscular spasm. This results from direct effect of muscle spasm in stimulating mechanosensitive pain receptors. It can also occur from the compression of the blood vessels and ischemia will be the outcome of this phenomenon. Further, muscular spasm causes increased basal metabolic rate

[17] When there is a loss of whole blood, following mechanisms will come into action.
1. A slight change in blood volume causes marked change in cardiac output
2. A slight change change in cardiac output causes a large change in blood pressure
3. a slight change in blood pressure causes a large change in urine output

By all above actions, fluid in the interstitial compartment transferred into intravascular compartment

[18] Let us take the example of fasting. Most of the tissues prefer carbohydrate for energy over fat and proteins, the quantity of carbohydrate normally stored in the entire body is only above few hundred grams (mainly glycogen in the liver and muscles). This amount of carbohydrate can supply for the bodily functions for the duration of half a day.
The order of depletion of the macro nutrients during fasting is carbohydrate depletion followed by fat and protein depletion. When the person is passing the phase of fat and protein depletion, the person likely to become emaciated.

[19] Glycogen lactic acid system is utilised in 100 meter swimming; whereas in 200 meters and 400 meters swimming; glycogen lactic acid an d aerobic systems will be into action. Thus, there will be rapid depletion of nutrients in the body. This will lead to leanness of the body. Thus, there will be *Vata* vitiation in the body.

[20] Lifting heavy weight in cases of weight lifters or labourers, this may lead to the increase in intra spinal pressure thereby manifesting the radicular pain. As per fundamentals of *Ayurveda*, *Vata* is invariably afflicted when one is experiencing the pain.

[21] Horse riding induces various physiological changes (muscle strength, balance, oxidative capacity, flexibility and metabolic control). Thus, excess horse riding may lead to increased metabolic activity, thereby leading to excess catabolism in the body.

[22] Most of the vegetables are rich in moisture content. Let us take the example of carrot. For 100 gms of carrot, 86 gms are related to moisture. Thus, when the vegetables are becoming older, then the moisture content of vegetable will be decreased and vegetable will be dried (*Ruksha*). Thus, the body will not get ade-

responsible for the vitiation of *Vata Dosha* due to the *Samanya* principle

- ⇨ ***Valluraka*** – dry meat[23] is responsible for the vitiation of *Vata Dosha* due to the Samanya principle
- ⇨ ***Varaka* or *Varatika*** – a special type of *Dhanya*
- ⇨ ***Uddalaka*** – *Aranya Kodrava* (a kind of honey or Indian cherry or bird lime tree)
- ⇨ ***Koradusha*** – type of Trina *Dhanya* or kodo millet having *Kashaya* (astringent), *Madhura* (sweet) taste, *Laghu* (light to digest), *Vatala* (responsible for *Vata* vitiation), *Shita* (cold) in potency, *Sangrahi* (absorption in the alimentary canal), *Shoshana* (dryness of the body).

सकोरदूषः श्यामाकः कषायमधुरो लघुः।
वातलः कफपित्तघ्नः शीतः संग्राहिशोषणः॥
हस्तिश्यामाकनीवारतोयपर्णीगवेधुकाः॥

Ca.Su. – 27/16-17

- ⇨ ***Shyamaka***– Indian barnyard millet, the qualities are described in the context of *Koradusha*.
- ⇨ ***Neevara***– Wild rice, the qualities are described in the context of *Koradusha*
- ⇨ ***Mudga*** – green gram[24] products. *Mudga* is having the properties such as *Kashaya Rasa* (astringent taste), *Ruksha* (dry) quality, *Laghu* (light to digest), *Shita* (cold) in potency, *Katu Vipaka*, *Vishada* (clear or non slimy) and responsible for the depletion of *Kapha* and *Pitta Dosha* from the body.

कषायमधुरो रूक्षः शीतः पाके कटुर्लघुः।
विशदः श्लेष्मपित्तघ्नो मुद्गः सूप्योत्तमो मतः॥

Ca.Su. – 27/23

- ⇨ ***Masura*** – lentil,[25] the qualities of *Masura* are explained in the context of *Harenuka*
- ⇨ ***Adhaki*** – *Tuvari* or Bengal gram[26] or pigeon pea आढकी कफपित्तघ्नी वातला, Ca.Su. – 27/33
- ⇨ ***Harenu*** – kind of pea or pulse having the *Lakshana Laghu* (light to digest), *Shita* (cold) in potency, *Kashaya Rasa* (astringent taste), *Virukshana* (responsible for the increase of dryness in the body) and useful in *Pitta* and *Kaphaja Vikara*.

लघवः शीतमधुराः सकषाया विरूक्षणः॥
पित्तश्लेष्मणि शस्यन्ते सूपेष्वालेपनेषु च।

Ca.Su. – 27/28-29

- ⇨ ***Kalaya*** – green pea[27] Ca.Su. – 27/29
- ⇨ ***Nishpava*** – Indian bean Ca.Su. – 27/33
- ⇨ ***Anashana***– Alpabhojana (taking little amount of food) or *Upavasa* (fasting). This is responsible for *Dhatu Kshaya* (depletion of body tissues), thereby responsible for the vitiation of *Vata Dosha*

GK

quate water content through vegetables.

[23] When we take most of the meat of 100 gm such as beef, mutton, pork etc contain about 70 gm of moisture. When the meat is kept for long time or dried, then mass of the meat is much reduced. Thus, *Ruksha guna* is increased in meat, thereby leading to the increase of *Vata Dosha*.

[24] 100 gm of green gram whole (Phaseolus aureus) contains 10.4 gm of moisture, 24 gm of protein, 1.3 gm of fat, 4.1 gm of fibre, 56.6 gm of carbohydrate, 0.14 gm of calcium, 0.28 gm of phosphorus, 8.4 mg of iron, 334 kcal of energy, 94 µg of carotene, 0.47 mg of thiamine, 2.0 mg of niacin, 0.39 mg of riboflavin

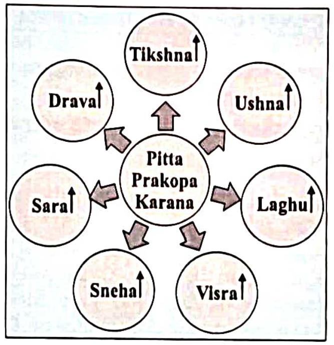
[25] 100 gm of Lentil (Lens culinaris) contains 12.4 gm of moisture, 25.1 gm of proteins, 0.7 gm of fat, 59.0 gm of carbohydrate, 0.13 gm of calcium, 0.25 gm of phosphorus, 2.0 mg of iron, 343 kcal of energy, 270 µg of carotene, 0.45 mg of thiamine, 2.5 mg of niacin, 0.20 gm of riboflavin.

[26] 100 gm of whole Bengal gram (Cicer arietinum) contains 9.8 gm of moisture, 17.1 gm of proteins, 5.3 gm of fibre, 3.9 gm of fibre, 61.2 gm of carbohydrate, 0.19 gm of calcium, 0.24 gm of phosphorus, 9.8 mg of iron, 361 kcal of energy, 190 µg of carotene, 0.30 mg of thiamine, 2.6 mg of niacin and 0.35 mg of riboflavin.

[27] 100 gm of green peas (Pisum sativum) contains 72.4 gm of moisture, 7.2 gm of protein, 0.1 gm of fat, 4.0 gm of fibre, 19.8 gm of carbohydrate, 0.02 gm of calcium, 0.08 gm of phosphorus, 1.5 mg of iron, 41 kcal of energy, 58 µg of carotene, 0.07 mg of thiamine, 0.6 mg of niacin, 0.10 mg of riboflavin and 9 mg of ascorbic acid.

- ⇨ ***Vishamashana***– Taking the food at improper time
- ⇨ ***Adhyashana*** – Taking the food without the digestion of previously ingested food
- ⇨ ***Vata Vega Vighata*** – suppression of *Vata Vega* (flatus)[28]
- ⇨ ***Mutra Vega Vighata*** – suppression of urge of micturition
- ⇨ ***Purisha Vega Vighata*** – suppression of urge of defaecation
- ⇨ ***Kshavathu Vega Vighata*** – suppression of sneezing[29]
- ⇨ ***Shukra Vega Vighata*** – suppression of ejaculation
- ⇨ ***Chardi Vega Vighata*** – suppression of vomiting[30]
- ⇨ ***Udgara Vega Vighata*** – suppression of belching
- ⇨ ***Bashpa Vega Vighata*** – suppression of tears

Chart 2.2: The effect of Pitta Prakopaka Karana on Gunas of Pitta Dosha



GK

[28] Flatus can enter the large intestine from three sources:
1. Swallowed air
2. Gases formed in the gut as a result of bacterial action
3. Gases that diffuse from the blood into gastro intestinal tract
Most gases formed in the stomach are mixtures of nitrogen and oxygen derived from swallowed air. In large intestine, most of the gases are derived from bacterial action, including carbon dioxide, methane and hydrogen.
The amount of gases entering or forming in the large intestine each day averages about 7 to 10 liters, where as the amount of air expelled through anus is usually about 0.6 liter. The remainder is normally absorbed into the blood through intestinal mucosa and expelled through lungs.

[29] Sneeze reflex is very much like cough reflex. The main difference in cough and sneeze reflex is sneeze reflex applies to nasal passage whereas cough reflex is related to lower respiratory passages.
Initial stimulus is irritation in nasal passage. The impulse passes in 5th cranial nerve to medulla where the reflex is triggered. First about 2.5 liters of air is rapidly inspired. Uvula is depressed and large amount of air passes rapidly through nose, leading to the movement of foreign bodies to the exterior. In case of suppression of sneezing, the external movement of foreign bodies will be lost, leading to the reverse movement into lower respiratory passages. Thus, initiating the cough reflex.

[30] The effects of vomiting act after the stimulation of vomiting centre are as follow:
1. Deep breath
2. Raising of hyoid bone and larynx to pull the upper oesophageal sphincter
3. Closing of the glottis to prevent vomitus flow into the lungs
4. Lifting of soft palate to close the posterior nares.
5. Strong downward contraction of diaphragm along with simultaneous contraction of all muscles of abdominal wall
6. Squeezing of the stomach between diaphragm and abdominal muscles building the intragastric pressure to high level.
7. Relaxation of lower oesophageal sphincter leading to expulsion of the gastric contents from the stomach.
In case of suppression of vomiting, there will be the chance of entry of food into either upper or lower respiratory passages, thereby initiating the cough reflex

⇨ The above said suppression of the *Vegas* are responsible for the *Udavarta* (reverse movement of vitiated *Dosha*). For the better understanding, we will discuss the act of flatus formation, vomiting and sneeze reflex and their effects.

Etiological factors of vitiation of Pitta Dosha

कट्वम्लोष्णविदाहितीक्ष्ण लवणक्रोधोपवासातप स्त्रीसंपर्क
तिलातसी दधिसुराशुक्तारनालादिभिः।
भुक्ते जीर्यति भोजने च शरदि ग्रीष्मे सति प्राणिनां मध्याह्ने
तथार्धरात्रि समये पित्तं प्रकोपं व्रजेत्॥ मा.नि. - 1/, मधु

***Katu, Amla* and *Lavana* substances** – substances which are having the pungent, sour[31] and salt[32] taste are responsible for the increase of *Pitta* in the body. *Katu Rasa* is having the dominance of *Agni* and *Vayu Mahabhuta*, *Amla Rasa* is having the dominance of *Agni* and *Prithvi Mahabhuta* and *Lavana Rasa* is having the dominance of *Agni* and *Jala Mahabhuta*. These *Rasa* are having *Agni Mahabhuta* as common *Mahabhuta*. Thus, the person who takes these substances, *Agni Mahabhuta* is likely going to increase in the body. The substances such as pickles, *chat* items etc are going to increase *Pitta Dosha* in the body. As per *Samanya Vishesha Siddhanta*, the above substances likely to increase *Pitta Dosha* in the body.

***Ushna* substances** – *Svedana Karma* (A.H.Su. 1/18) will be in excess in case of excess consumption of *Ushna Guna* and *Ushna Virya* substances. *Ushna*[33] *guna* is considered to be one of the main *guna* of *Pitta Dosha* in the body.

***Vidahi* and *Tikshna* substances** – Substances which are responsible for the burning sensation of the body. The increase of *Tikshna* in the body is responsible for excess *Shodhana*[34] (purificatory function) *Karma* in the body. *Dalhana* gives two meanings for the word '*Vidaha*'. 1st meaning is *Vidaha* due to the *Ahara* which results in *Sopha*. The second meaning is *Vidahi* is the one which digests with difficulty and is responsible for the *Lakshana* such as *Amlodgara, Trishna* etc.

यासः शरीरपीडा।
विदग्धं विदाहः, स च शोफरोगाहारादिकृतः।
विदाहीति यदम्लोद्गारदाहतृष्णाप्रभृतीनुदीर्य
कृच्छ्रात् पाकमुपगच्छति तत् विदाहि।
Su.Su. – 21/21, *Dalhana*

Krodha – excess anger[35]. *Krodha* is responsible for the increase of *Pitta* or vice versa. *Krodha* is the *Manasika* (mental) factor which has direct and proportional relation with *Pitta Dosha* (Ca. Ci. – 3/115). The if the person is going to become angry frequently, one can suspect the vitiation of *Pitta Dosha* in the body.

Upavasa – person who has the habit of frequent fasting[36] or starvation. *Upavasa* (fasting) is considered to be one of *Langhana* line of treatment. If the person has the habit of doing excess *Upavasa*, there will be increase of *Laghu Guna* in the body. *Laghu Guna* has the close proximity to *Pitta Dosha*. Thus frequent fasting will lead to the increase of *Pitta Dosha* in the body. Thus, the people who have the habit of skipping the food frequently, likely to develop the *Pitta* dominant diseases.

Atapa – exposure to sunlight.[37] *Atapa* is also considered to be one of the *Langhana* line of treatment. This results in increase of *Laghu, Ushna Guna* in the body thereby results in the *Pitta Dosha Prakopa*.

Stri samparka – frequent sexual intercourse.[38] Frequent sexual contact[39] is responsible for the depletion of *Shukra Dhatu* from the body. Any type of *Dhatu Kshaya* in the body is responsible for the increase of *Vata Dosha* in the body. Excess indulgence in sexual activity is responsible for the increase of *Rajo Guna* in the body. *Agni Mahabhuta* is having the dominance of *Satva* and *Rajo Guna*. Thus, excess indulgence in copulation is responsible for the vitiation of *Pitta* and *Vata Dosha*.

Tila – The qualities of *Tila* (sesame seeds)[40] are as follow:

ईषत्कषायो मधुरः सतिक्तः सांग्राहिकः पित्तकरस्तथोष्णः॥
तिलो विपाके मधुरो बलिष्ठः स्निग्धो व्रणालेपन एव
पथ्यः॥3 9॥
दन्त्योऽग्निमेधाजननोऽल्पमूत्रस्तन्योऽथ केश्योऽनिलहा
गुरुश्च॥ (Su.Su. – 46/39-40)

Madhura Pradhana Rasa; Kashaya and *Tikta Anurasa, Ushna Virya* and *aggrevates Pitta, Vatahara, Madhura Vipaka*. This drug is ideal for the *Vrana lepana*; useful in dental disease; helpful in increasing *Agni* and *Medha*; good for skin diseases and *Alpamutrakara* (less urine will be formed). Due to its *Ushna Virya*, it is said to be responsible for the vitiation of *Pitta Dosha*.

GK

31 Sour taste is caused by acids, that is by hydrogen ion concentration. The more acidic the food, the stronger the sour taste becomes

32 The salt taste is elicited by ionised salts, mainly by sodium concentration. The quality of salt taste varies from one to another depending upon the degree of sodium ions concentration.

33 Due to the increase of *Ushna Guna* (hot quality), there will be the dilatation of blood vessels which supply the alimentary canal. Thus, there will be increased secretions occur in the alimentary canal.

34 This occurs due to the inflammation of the inflammation of the gastro intestinal mucosa, thereby increased secretion in the lumen occurs. This will result in the decrease in the fluid in intravascular compartment which will be supplemented by the transfer of the fluid in the interstitial compartment. If this transfer is not happening, then the person will get the sensation of thirst. Due to the increase in gastric secretions, the person may develop the sour belching due to the increase in hydrochloric acid in stomach.

35 Anger activates sympathetic nervous system. The effect of sympathetic nervous system on different parts of the body are
1. Increase in arterial pressure
2. Increase in heart rate and pulse rate
3. Vaso constriction of different glands such as nasal, lacrimal, parotid, pancreatic and gastric glands
4. Increased production of sweat from sweat glands
5. Decreased urine output

GK

36 When the person is in fasting, intestinal motility enters into a pattern called migrating myoelectric complex (MMC), where in the incidence changes from no contraction with slow waves to the maximum contractions with every slow wave. The length of MMC is 90 minutes at any one point in intestine. This cycle usually begins at the pylorus.
MMC cycle consists of 3 phases:
1. Phase 1: lasts about 70 minutes in man, there are no contractions.
2. Phase 2: contractions occur with each slow wave in groups of 1-5, but with intervening periods of 1-5 slow wave without contractions. This lasts for 10-20 minutes.
3. Phase 3: Contractions occur with every slow wave for a period of 1-5 minutes. Then the incidence of contractions quickly declines to zero, thereby repeating to phase 1.
During fasting, after eating, the gall bladder contracts for a longer time, leading to the movement of more amount of bile into bile duct. But, in fasting state, sphincter of Oddi is producing a resistance so that little amount of bile is secreted into duodenum, a large amount of bile is diverted to gall bladder itself. Thus we can indirectly infer the vitiation of *Pitta Dosha* for a short duration.

37 When the body temperature raises beyond the range of 105°F to 108°F, the person likely to develop heat stroke. The symptoms include dizziness, abdominal distress accompanied by vomiting, delirium and loss of consciousness. These symptoms are exacerbated by circulatory shock brought on by excessive loss of fluid and electrolytes through sweat

38 Frequent sexual intercourse will be responsible the activation of sympathetic nervous system and raises the basal metabolic rate. This is identified by increase in heart rate, pulse rate, increase in respiratory rate. Due to the increase in basal metabolic rate, there will be increase in production of heat during the metabolism

39 Infection and inflammation of urethra, urinary bladder, prostate, seminal vesicles, testes, vas deferens causes intense sexual desire or increased libido. This is because of the irritation of urinary bladder and urethral mucosa and vascular congestion.

40 The protein content of sesame seeds varies from 16-20%; and oil content – 55-60%. The whole seed is a good source of thiamine and a fair source of riboflavin and niacin. The seed is rich in calcium. Most calcium is present as oxalate in the seed coat. The dehusked seed has low calcium and oxalic acid.

Atasi

उष्णातसी स्वादुरसाऽनिलघ्नी पित्तोल्बणा स्यात् कटुका विपाके।। Su.Su. – 46/49

Atasi or common flax seed[41] is having *Madhura Rasa, Ushna Virya, Vatahara* and *Pittahara* and *Katu Vipaka*. Thus, excess consumption of common flax seed is responsible for the vitiation of *Pitta Dosa* due to *Ushna Virya* and *Katu Vipaka*.

Dadhi – curds[42] which are having sour taste.

दधि तु मधुरमम्लमत्यम्लं चेति।
तत्कषायानुरसं स्निग्धमुष्णं पीनसविषमज्वरातिसारारोचकमूत्रकृच्छ्रकार्श्यापहं वृष्यं प्राणहरं मङ्गल्यं च।।
Su.Su. – 45/65

अन्ये त्वेवं पठन्ति- 'दधि तु मधुर सृष्टपुरीषं गुर्वम्लमभिष्यन्दि श्लेष्मपित्तशोफवर्धनं कार्श्यापहं रोचनं माङ्गल्यं च।
तदेव चोद्धृतसारं ग्राह्यनभिष्यन्दि च।
ससरं कफमेदःशुक्रकृत्।
त्रिदोषकृन्मन्दजातं' इति।। Su.Su. – 45/65, Dalhana

Amla Dadhi is having *Amla Rasa, Ushna Virya* and *Amla Vipaka*. Thus curds having sour taste likely to vitiate *Pitta Dosha* and *Sroto Abhishyandikara* (causing obstruction in the channels) whereas the *Dadhi* which is having *Madhura Rasa* and *Abhishyandakara* is likely to vitiate *Kapha Dosha*.

Sura, Sukta **and *Aranala*** **etc** – intoxicating substances[43]. These substances are having *Amla Rasa, Ushna Virya* and *Amla Vipaka* in general.

प्रकृत्या मद्यमम्लोष्णमम्लं चोक्तं विपाकतः।
सर्वे सामान्यतस्तस्य विशेष उपदेक्ष्यते।।
Ca.Su. – 27/178

As the qualities are similar to that of *Pitta Dosha*, the excess consumption of *Sura* etc intoxicating substances are likely to vitiate *Pitta Dosha*.

Bhukte jiryati bhojane ca – at the time of digestion of the food. As per literature, *Pitta Dosha* will be dominant during the digestion of food. At the beginning of digestion of food i.e. soon after the food intake and after the digestion of food, *Kapha* and *Vata Dosha* will be dominant respectively. *Sarat* – **in** *Sarad Ritu* **and** *Grishma Ritu* – in *Grishma Ritu Pitta Dosha* will be dominant during these seasons. If the person is suffering from *Pitta* dominant illness, the symptoms will be severe during these seasons. *Madhyahna* and *Madhyaratri* – in noon time and midnight. *Pitta Dosha* will be dominant during these periods. If the person is suffering from *Pitta* dominant disease, the symptoms will be severe during these periods. This understanding is based on *Achayapurvaka Prakopa*.

Causative factors of Pitta Prakopa are as follow (As per Sushruta)

- ⇨ ***Krodha*** – anger[44]

- ⇨ ***Shoka*** – grief
- ⇨ ***Bhaya*** – fear
- ⇨ ***Ayasa*** – excess exhaustion
- ⇨ ***Upavasa*** – fasting[45]
- ⇨ ***Vidagdha*** – consumption of substances causing *Vidagdhata* (the substances[46] which are causing swelling, redness etc);
- ⇨ ***Vidahi*** substances[47]– the substances which will cause sour eructations, burning sensation, thirst etc) thereby there will be delay in the digestion
- ⇨ ***Maithuna Upagama***– excess sexual intercourse, the explanation was given earlier in the same chapter.
- ⇨ ***Katu, Amla, Lavana, Tikshna, Ushna, Laghu*** substances
- ⇨ ***Tila Taila***– excess consumption of substances prepared from *Tila Taila* or consumption of *Tila Taila*
- ⇨ ***Pinyaka***– oil cake or paste of *Tila* after extracting the oil
- ⇨ ***Kulattha***– horse gram[48] is considered to be prime cause for the manifestation of *Amlapitta*. *Amlapitta* is considered as *Pitta* dominant disease.

उष्णाः कषायाः पाकेऽम्लाः कफशुक्रानिलापहाः।
कुलत्था ग्राहिणः कासहिक्काश्वासार्शसां हिताः।।
Ca.Su. – 27/26

- ⇨ ***Sarshapa*** - mustard[49]
- ⇨ ***Atasi*** – common flax seed, the description is given earlier in the context of causes of vitiation of *Pitta Dosha*.
- ⇨ ***Harita Shaka*** (green leafy vegetables)[50] are responsible for the pacification of *Vata* and

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GK

41 Flax (Linum usitatissimum) also known as common flax or linseed. It is a food and fibre crop cultivated in cooler regions of the world. 100 gm of flaxseed 41 gm of fat, 28 gm of fibre and 20 gm of protein. Sprouts of flaxseed are edible. Excessive consumption of flaxseeds with inadequate amount of water may cause intestinal obstruction.
In North India, flaxseed is known as alsi or tisi and eaten with boiled rice, a little water and a little salt. In India, linseed oil is known as alsi in Hindi and Javas in Marathi. It is mainly used in *Savji* curries such as mutton (goat meat) curries.

42 100 gm of curds from cow's milk contains 90.3 gm of moisture, 2.9 gm of protein, 2.9 gm of fat, 3.3 gm of carbohydrate, 0.12 gm of calcium, 0.19 gm of phosphorus, 0.3 mg of iron, 51 kcal is the calorific value, 39 µg of vitamin A, traces of carotene, 0.05 mg of vitamin B1, 0.1 mg of nicotinic acid, 0.06 mg of riboflavin and 5 mg of vitamin C

43 The example ofintoxicating substances is alcohol. The consumption of ethyl alcohol is having the action of breaking down the mucosal barrier. Thus, the muscular layer of stomach is exposed to the secretion of hydrochloric acid. Thereby there is formation of peptic ulcer in the person who is having the habit of alcohol consumption.

44 When the person is having emotions such as anger, grief and fear activation of limbic system takes place, this in turn responsible for the activation of sympathetic nervous system. Activation of sympathetic nervous system leads to the
1. Copious secretion of sweat from sweat glands
2. Increased heart rate
3. Increased basal metabolic rate
4. Increased peripheral circulation
5. Decreased secretion of nasal, lachrymal, salivary and gastric secretions
All above physiological events imply the increase of *Pitta* in the body.

45 Hunger contractions are rhythmical contractions in the body of the stomach when the stomach has been empty for several hours or more. These contractions will become succeedingly strong and persist for 2-3 minutes. These are intense in the young and healthy people who have very strong alimentary canal function.
When hunger contractions occur in the stomach, the person sometimes experiences mild pain in the pit of the stomach and this is termed as hunger pangs. Hunger pangs do not begin until 12 to 24 hours after last ingestion of food. In starvation, they reach their greatest intensity in 3 to 4 days and gradually weaken in succeeding days.
If we analyse the term hunger pangs, we can say this could be due to the increase of *Pitta Dosha* in the body.

46 The substances which are spicy, such as pickle etc are responsible for the inflammation of the alimentary mucosa. The inflammation of gastric mucosa is responsible for the erosion of mucosal layer, thereby leading to the manifestation of peptic ulcer.

47 *Vidahi* substances are those which are responsible for sour eructation, burning sensation and thirst. Fried items such as gobi Manchurian, fried rice, bread are some of the examples of *Vidahi* substances

48 100 gm of horse gram (Dolichos biflorus) contains 11.8 gm of moisture, 22.0 gm of proteins, 0.5 gm of fat, 5.3 gm of fibre, 57.3 gm of carbohydrate, 0.28 gm of calcium, 0.39 gm of phosphorus, 7.6 mg of iron, 322 kcal of energy, 71 µg of carotene, 0.42 mg of thiamine, 1.5 mg of niacin, 0.20 mg of riboflavin

49 100 gm of mustard contains 8.5 gm of moisture, 22 gm of protein, 39.7 gm of fat, 1.8 gm of fibre, 23.8 gm of carbohydrate, 0.49 gm of calcium, 0.7 gm of phosphorus, 17.9 mg of iron, 541 kcal of energy, 270µg of carotene, 4 mg of niacin and 0.08 mg of riboflavin

50 Green leafy vegetables are the rich source of carotene (Provitamin A). They are good sources of calcium, riboflavin, folic acid and vitamin C. Daily consumption of 100 gm of leafy vegetables by adults and 50 gm by children will provide the daily requirement of carotene, folic acid and vitamin C and part of calcium and riboflavin.

Kapha Dosha but vitiates *Pitta Dosha* in the body.

शुष्काणि कफवातघ्नान्येतान्येषा फलानि च।
हरितानामयं चैष षष्ठो वर्गः समाप्यते॥ Ca.Su. – 27/177

- ⇨ ***Godha Mamsa*** – *Iguana*. Based on the *Lakshana* seen in *Sushruta Samhita*, the quality responsible for the vitiation of *Pitta Dosha* is *Katu* (pungent) *Rasa* and rest of the qualities are leading to alleviation of *Pitta Dosha*.

गोधा विपाके मधुरा कषायकटुका स्मृता॥
वातपित्तप्रशमनी बृंहणी बलवर्धनी॥ Su.Su. – 46/81

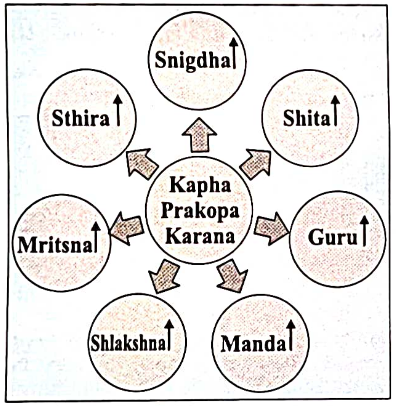
- ⇨ ***Matsya*** – fish[51] is responsible for vitiation of *Pitta Dosha* due to its *Ushna Virya*
- ⇨ ***Avika Mamsa*** – flesh of goat
- ⇨ ***Dadhi*** – curds having *Amla Rasa*,[52] this is explained earlier in the context of causes of vitiation of *Pitta*
- ⇨ ***Takra*** – butter milk having *Amla Rasa*[53] Su.Su. – 45/84, is responsible for the vitiation of *Pitta Dosha* in the body.

तत् पुनर्मधुरं श्लेष्मप्रकोपणं पित्तप्रशमनं च।
अम्लं वातघ्नं पित्तकरं च॥ Su.Su. – 45/88

- ⇨ ***Kurchika*** – Inspissated milk or its product
- ⇨ ***Mastu*** – whey
- ⇨ ***Sauviraka*** – fermentation of *Yava* (barley) which is boiled after removing husk
- ⇨ ***Sura Vikara***– excess consumption of intoxicating substances. These substances are having *Amla Rasa*, *Ushna Virya* and *Amla Vipaka*. Thus, there will be the vitiation of *Pitta Dosha*.
- ⇨ ***Amla Phala***– excess consumption of substances having *Amla Rasa*. This is naturally responsible for the vitiation of *Pitta Dosha*. *Amla Rasa* possesses *Prithvi* and *Agni Mahabhuta*. That is why, the consumption of substances having *Amla Rasa* likely to increase *Pitta Dosha*.
- ⇨ ***Katvara Dalhana***, Su.Su. – 21/21 Butter milk mixed with water

कट्वरमिति अस्नेहं दधि।
अन्ये भाषन्ते,-
"सौवीराम्लमथात्यम्लं काञ्जिकं कट्वरं विदुः।
अन्ये तु तदधोभागं तक्रं चात्यम्लताङ्गतम्।
सस्नेहं दधिजं तक्रमाहुरन्ये तु कट्वरम् "- इति।

Chart 2.3: The effect of Kapha Prakopaka Karana on Gunas of Kapha Dosha



Etiological factors of vitiation of Kapha Dosha

गुरुमधुररसातिस्निग्ध दुग्धेक्षुभक्ष्य द्रवदधिदिननिद्रापूप-सर्पिर्ष्प्रपूरैः।
तुहिनपतनकाले श्लेष्मणः संप्रकोपः प्रभवति दिवसादौ भुक्तमात्रे वसन्ते॥ मा.नि. - 1/5, मधु

Guru substances– Substances which are having *Guru* quality. द्रव्यस्य बृहणे कर्मणि शक्तिर्गुरू A.Hr. Su. – 1/18, *Hemadri* i.e. nourishing property. Generally, these substances will have *Madhura Rasa*, *Sita Virya* and *Madhura Vipaka* which are invariably responsible for the vitiation of *Kapha Dosha*. The substances such as *Masha* (blackgram) are having *Guru Guna*, *Dadhi* (curds), *Kshira* (milk), *Kapha* vitiating substances.

Madhura Rasa– substances which are having *Madhura* (sweet taste)[54] *Rasa*. Generally these substances will have *Guru*, *Snigdha Guna*, *Sita Virya* and *Madhura Vipaka*. The substances prepared from *Ikshu* (sugar cane); *Kshira* (milk) are having *Madhura Rasa*.

Atisnigdha– substances which are having excess *Snigdha Guna* क्लेदने स्निग्ध A.Hr.Su. – 1/18, *Hemadri* (unctuous nature). These results in the increase of *Snigdha Guna* in the body causes *Kapha Prakopa*.

Dugdha Bhakshya –

स्वादु शीतं मृदु स्निग्धं बहलं श्लक्ष्णपिच्छिलम्।
गुरु मन्दं प्रसन्नं च गव्यं दशगुणं पयः॥2 1 7॥
Ca.Su. – 27/217

Milk[55] and its products such as curds etc are having *Madhura rasa*, *Guru Snigdha Guna* and *Madhura Vipaka*. These are responsible for vitiation of *Kapha Dosha*.

Ikshu Bhakshya –

वृष्यः शीतः सरः स्निग्धो बृंहणो मधुरो रसः।
श्लेष्मलो भक्षितस्येक्षोर्यान्त्रिकस्तु विदह्यते॥2 3 7॥
Ca.Su. – 27/237

Sugar[56] cane and its products such as sugar, jaggery etc. are having *Madhura Rasa*, *Guru Snigdha Guna* and *Madhura Vipaka*. These are responsible for vitiation of *Kapha Dosha*.

Drava – substances which are having *Drava* quality. This is responsible for the increase of *Ap Mahabhuta* thereby responsible for the vitiation of *Kapha Dosha*.

Dadhi

रोचनं दीपनं वृष्यं स्नेहनं बलवर्धनम्।
पाकेऽम्लमुष्णं वातघ्नं मङ्गल्यं बृंहणं दधि॥2 2 5॥
Ca.Su. – 27/225

करं, माङ्गल्यं मङ्गलहेतुः।
अन्ये त्वेवं पठन्ति-'दधि तु मधुर सृष्टपुरीषं गुर्वम्लमभिष्यन्दि
श्लेष्मपित्तशोफवर्धनं कार्श्यापहं रोचनं माङ्गल्यं च।
तदेव चोद्धृतसारं ग्राह्यानभिष्यन्दि च।
ससरं कफमेदःशुक्रकृत्। त्रिदोषकृन्मन्दजातं' इति॥6 5॥
Su.Su. – 45/65, *Dalhana*

Dadhi (curds)[57] is having *Madhura Rasa*, *Guru*, *Abhishyandi* quality and responsible for vitiation of *Kapha*. This is responsible for vitiation of *Kapha Dosha*.

Dinanidra – sleeping in day time.[58] As per *Caraka*

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[51] Fish is a good source of proteins containing from 17-20%. It is a fair source of certain B vitamins. Fish proteins are being rich in lysine and threonine, supplementing cereal proteins. Large fish are the source of iron and phosphorus and poor source of iron, whereas small fishes along with bones are the rich sources of calcium.

[52] Consumption of curds having sour taste will lead to the inflammation of gastric mucosa, thereby there will be the possibility of burning sensation in the epigastrium and sour eructations

[53] Consumption of butter milk with sour taste will lead to inflammation of gastric mucosa like sour curds. The clinical presentation will be similar to the consumption of sour curds.

[54] The sweet taste is caused by the chemicals that include sugars, glycols, alcohols, aldehydes, ketones, amides, esters and some amino acids. Most substances causing sweet taste are organic materials.

[55] Human milk contains lactose about 7%; cow's and buffalo's milk contains 4% of lactose. When compared to cow's milk, it contains 3.5% of proteins and 3.5% of fats; buffalo's milk contains 4.1% proteins and 7% of fats. Other components of milk in little quantity are Vitamin A, thiamine, riboflavin, niacin, vitamin B12, folic acid, ascorbic acid, calcium, phosphorus, magnesium and potassium. Milk is poor source of iron.

[56] Sucrose is the main content of sugar cane. This will provide the energy for body function and during work. This is also essential for oxidation of fats.

[57] Curds is formed by the fermentation of milk by mixed lactic organisms and lactose is converted into lactic acid. The nutritive value of curds is similar to milk. The curds prepared out of cow's milk contains proteins 3.5%, fats 3.5% and lactose 4,5%, vitamins A, thiamine, riboflavin, niacin, vitamin B12, folic acid and ascorbic acid, calcium and other mineral such as phosphorus, magnesium and potassium.

[58] In obese people, the people will be having the collapse of upper airways during sleep due to the fall in the tone of airway dilator muscles. It is often associated with loud snoring, daytime sleepiness and behavioural changes.
Sleep is responsible for
1. changes in muscle tone – hypotonia of limb muscles and increase in tone of neck and back muscles

Samhita, sleeping in day time is responsible for the increase of *Snigdha Guna* in the body thereby responsible for the vitiation of *Kapha Dosha*.

रात्री जागरणं रूक्षं स्निग्धं प्रस्वपनं दिवा।
अरूक्षमनभिष्यन्दि त्वासीनप्रचलायितम्॥5॥ Ca.Su. – 21/50

***Apupa*–** The cake prepared from wheat flour,[59] a kind of fine bread. *Godhuma* (wheat) is having the qualities of *Sandhanakara* (proper joining of the joints), *Svadu* (sweet) taste, *Vatahara* (property of alleviation of vitiated *Vata*), *Shita* (cold) in potency, *Brimhana* (nourishing property), *Snigdha* (unctuous), *Sthairyakara* (firmness), *Guru* (heavy to digest). Excess consumption of *Apupa* is responsible for the abnormal vitiation of *Kapha Dosha*.

***Sarpi*–** As *Sarpi* (*Ghrita* or ghee)[60] is having *Pitta* and *Vatahara* property, good for the functioning of *Rasa*, *Shukra* and *Ojas*, *Mridukara* (produces softness in the body), *Svaravarnaprasadana* (good for the voice and complexion). This implies there will be vitiation of *Kapha Dosha* in the body. Excess consumption likely to increase the *Kapha Dosa* in the body.

घृतं पित्तानिलहरं रसशुक्रौजसां हितम्।
निर्वापणं मृदुकरं स्वरवर्णप्रसादनम्॥14॥ Ca.Su. – 13/14

Prapura – This is a type of dish prepared by filling up different vegetables or sweet preparation such as *Alu Parota* or *Bhaji* etc.

***Tuhina patana kala*–** season of falling of mist or dew. This particular season is mainly having *Sita Guna*. During this season, there will be vitiation of *Kapha Dosha*. This is natural vitiation.

***Divasadou*–** early part of the day or morning. This type of *Kapha Prakopa* is considered to be due to *Achaya Prakopa*. That means *Sanchaya* stage is not necessary for the vitiation of *Kapha Dosha* in this particular instance.

***Bhukta matra*–** soon after the food intake.[61] This type of *Kapha Dosha* is considered to be due to *Achaya Prakopa*. That means *Sanchaya* stage is not essential for the vitiation of *Kapha Dosha*.

***Vasanta*–** in *Vasanta Ritu*. *Vasanta Ritu* is considered to be natural season where in one can have vitiation of *Kapha Dosha*. This is considered to be due to *Achaya Prakopa*. In this particular instance, *Kapha Dosha Prakopa* is seen without prior *Sanchayavastha*.

Causative factors of vitiation of Kapha Dosha are as follow (As per Sushruta)

***Divasvapna*–** sleeping during day time. This is responsible for the increase of *Snigdha Guna*. Based on *Samanya* principle, there will be the increase of *Kapha Dosha* in the body.

राजौ जागरणं रूक्षं स्निग्धं प्रस्वपनं दिवा।
अरूक्षमनभिष्यन्दि त्वासीनप्रचलायितम्॥50॥

Ca.Su. – 21/50

- ⇨ ***Avyayama*–** no or negligible physical activity or sedentary life style[62]

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2. somatomotor and autonomic changes – closed eyes, lower heart rate and BP. This will lead to reduced metabolism in the body and in turn leads to weight gain too.

[59] Wheat flour is having protein content varies between 11-15%, it has good source of thiamine, nicotinic acid and other B vitamins. It is also having considerable amount of calcium and iron, and a good source of phosphorus.

[60] Ghee is 100% fat and contains 2000 IU of vitamin A per 100 gm of ghee. Whereas butter contains 81% fat and 3500 IU of vitamin per 100 gms of butter.

[61] After meal, motor activity, secretory function and absorptive function of the alimentary canal will be increased by shifting the increased blood supply to the alimentary canal from skeletal muscles and brain. There by person will be drousy after the food intake.

[62] Regular physical activity and physical training are known to increase the muscle mass and decreased body fat mass, whereas inadequate physical activity is associated with decreased muscle mass and increased adipose tissue in the body.
About 25-30% of the energy is used by the average person undergoes into muscular activity, whereas in labourer 60-70% of the energy is utilised by the body during exercise. During lack of exercise, the anabolic

- ⇨ ***Alasya*–** laziness[63]
- ⇨ Excess consumption of *Madhura*, *Amla*, *Lavana*, *Snigdha*, *Shita*, *Guru*, *Picchila*, *Abhishyandi* substances
- ⇨ ***Hayanaka*** हाय- नकः घोटकपुच्छः, स च शालिविशेषः। *Dalhana*, Su.Su. – 21/23 type of *Shali* or rice
- ⇨ ***Yavaka*–** barley.[64] Ca.Su. – 27/19 and Su.Su. – 46/41 states the qualities of *Yava* (barley). Here, the only quality responsible for the vitiation of *Kapha Dosha* is *Shita Virya* (cold potency).
- ⇨ ***Naishadha*** नैषधः 'कोरक' इत्याख्यायते, स च इत्याख्यायते, स च धान्यविशेषः Dalhana, Su.Su. -21/23 type of grain
- ⇨ ***Itkata*** इत्कटः खग्गली *Dalhana*, Su.Su. – 21/23 prickly sesban or kind of seed or grass
- ⇨ ***Masha*** – black gram[65] having the qualities such as *Vrishya* (aphrodisiac), *Vatahara* (alleviation of symptoms of vitiated *Vata*), *Snigdha* (unctuousness), *Ushna* (hot) in potency, *Madhura* (sweet) taste, *Guru* (heavy to digest), *Balya* (strengthening), *Bahumala* (excess production of excreta), *Pumstva* (potency). In total, excess consumption of *Masha* is responsible for the abnormal increase of *Kapha Dosha* in the body.

वृष्यः परं वातहरः स्निग्धोष्णो मधुरो गुरुः।
बल्यो बहुमलः पुंस्त्वं माषः शीघ्रं ददादि च॥24॥

Ca.Su. – 27/24

- ⇨ ***Mahamasha*–** species of large bean
- ⇨ ***Godhuma*–** wheat.[66] The qualities of *Godhuma* are *Sandhanakara* (proper joining of the joints), *Svadu* (sweet) taste, *Vatahara* (property of alleviation of vitiated *Vata*), *Shita* (cold) in potency, *Brimhana* (nourishing property), *Snigdha* (unctuous), *Sthairyakara* (firmness), *Guru* (heavy to digest). Excess consumption of wheat is responsible for the abnormal vitiation of *Kapha Dosha*.

सन्धानकृद्वातहरो गोधूमः स्वादुशीतलः।
जीवनो बृंहणो वृष्यः स्निग्धः स्थैर्यकरो गुरुः॥21॥

- ⇨ ***Tila Vikriti*–** substances prepared out of sesamum[67] seeds are responsible for vitiation of *Kapha* due to *Madhura Vipaka*, *Guru* (heavy to digest), *Snigdha* (unctuousness)

इषत्कषायो मधुरः सतिक्तः सांग्राहिकः पित्तकरस्तथोष्णः॥
तिलो विपाके मधुरो बलिष्ठः स्निग्धो व्रणालेपन एव पथ्यः॥39॥
दन्त्योऽग्निमेधाजननोऽल्पमूत्रस्तन्योऽथ केश्योऽनिलहा-
गुरुश्च॥ Su.Su. – 46/39-40

- ⇨ ***Pishta Vikriti*–** substances prepared out of flour
- ⇨ ***Dadhi*–** curds which is having *Madhura Rasa*. This context is explained in the context of *Dadhi* as an etiological factor of

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activity will be to the maximum, thereby food consumed will be converted into adipose tissue thereby leading to the increase in body weight.

[63] If the person is showing laziness, the above said mechanism of sedentary life style holds good.

[64] 100 gm of barley (Hordeum vulgare) is having 12.5 gm of moisture, 11.5 gm of protein, 1.3 gm of fat, 3.9 gm of fibre, 69.4 gm of carbohydrate, 0.03 gm of calcium, 0.23 gm of phosphorus, 3.7 mg of iron, 335 kcal of energy, 10 μg of carotene, 0.47 mg of thiamine, 4.7 mg of niacin and 0.20 mg of riboflavin.

[65] 100 gm of black gram (Phaseolus mungo) contains 10.9 gm of moisture, 24.0 gm of protein, 1.4 gm of fat, 0.9 gm of fibre, 60.3 gm of carbohydrate, 0.20 gm of calcium, 0.37 gm of phosphorus, 9.8 mg of iron, 350 kcal of energy, 38 μg of carotene, 0.42 mg of thiamine, 2 mg of niacin, 0.37 mg of riboflavin and ascorbic acid is absent.

[66] 100 gm of wheat floor (whole) (Triticum aestivum) contains 12.8 gm of moisture, 11.8 gm of protein, 1.5 gm of fat, 1.2 gm of fibre, 71.2 gm of carbohydrate, 0.05 gm of calcium, 0.32 gm of phosphorus, 5.3 mg of iron, 348 kcal of energy, 64 μg of carotene, 0.45 mg of thiamine, 5 mg of niacin, 0.17 mg of riboflavin and ascorbic acid is absent.

[67] Protein content of sesame seed varies from 16-20%, and oil content is 55-60%. The whole seed is a good source of thiamine and a fair source of riboflavin and niacin. The seed is rich in calcium. Most of the calcium is present as oxalate in the seed coat.

vitiation of *Pitta Dosha*

- ***Dugdha***– milk and milk products, this is explained in the context of vitiation of *Kapha Dosha* earlier.
- ***Krishara***– **कृशरा तिलतण्डुलमार्षैः कृता यवागूः।** *Dalhana*, Su.Su. – 21/23, as *Krishara* is prepared from *Tila* (sesamum seeds), *Tandula* (rice) and *Masha* (black gram), is responsible for the vitiation of *Kapha Dosha*.
- ***Payasa*** **पायसः क्षीरसिद्धा-स्तण्डुलाः।** *Dalhana*, Su.Su. – 21/23, *Payasa* as prepared from milk and rice, it is considered to be responsible for the vitiation of *Kapha Dosha*.
- ***Ikshu Vikara***– sugar cane and its products, this is explained in the context of vitiation of *Kapha Dosha* earlier.
- ***Anupa Mamsa* and *Vasa*– आनूपे स्निग्धशीतादि भेषजं यन्निषेव्यते॥88॥** Ca.Su. – 26/88 normally, the *Anupa Mamsa* (meat)[68] having *Snigdha* (unctuousness), *Shita* (cold) in potency which will vitiate the *Kapha Dosha*.
- ***Audaka Mamsa*** and *Vasa* for example, fish[69] is having *Madhura* (sweet) taste, *Guru* and *Snigdha Guna*, *Madhura Vipaka* and *Ushna* (hot) in potency. *Audaka Mamsa* will increase the *Kapha Dosha* in the body due to *Madhura Rasa*, *Guru* and *Snigdha Guna*, *Madhura Vipaka*
- **मत्स्याः स्निग्धाश्च वृष्याश्च बहुदोषाः प्रकीर्तिताः।**
- ***Bisa*** - **बिसं पद्ममूलं विशाण्ड इति लोके** Dalhana, Su.Su. – 21/23 lotus stalk
- ***Mrinala***– **मृणालं मद्ममू- लस्थप्ररोहाङ्कुरः।** Dalhana, Su.Su. – 21/23 lotus root
- ***Kasheruka***– bulrush or deer grass or grass weed
- ***Shringataka***- **शृङ्गाटकं जलमध्ये त्रिकण्टकम्।** Dalhana, Su.Su. – 21/23 water chest nut
- ***Madhura Valliphala***– *Tala Phala*, *Narikela Phala*; *Tala phala* (palm fruit) and *Narikela Phala* (coconut fruit)[70] are having the qualities of *Brimhana* (nutritious), *Snigdha* (unctuousness), *Shita* (cold) in potency, *Madhura* (sweet) taste and *Balya* (strength promoting). Thus, by looking the properties, we can say that there will be vitiation of *Kapha Dosha* in the body on excess consumption of these substances.

तालशस्यानि सिद्धानि नारिकेलफलानि च।
बृंहणस्निग्धशीतानि बल्यानि मधुराणि च॥130॥

Ca.Su. – 27/130

- ***Samashana***– consumption of *Pathya* and *Apathya* substances together is *Samashana*. For example, the consumption of *Raktashali* and *Yavakanna* together.
- ***Adhyashana***[71]– consumption of food substances prior to the digestion of previously ingested meals. This type of food intake gives no scope for the digestion of the previously ingested meal, thereby there will be formation of *Ama* in the *Amashaya*.

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68 Meat of cattle, calf, sheep, goat contains 17-20% proteins, it is a good source of B vitamins, iron, phosphorus, but a poor source of calcium. Meat of swine (pig) is rich in proteins upto 11-15%. Proteins are building blocks of the body.

69 Fish is a rich source of proteins upto 17-20%. It is a fair source of B vitamins. Lysine, threonine are the proteins present in fishes. Large fishes are a source of iron, phosphorus. Small fishes eaten along with bones are a rich source of calcium.

70 100 gm of fresh coconut fruit has 36.3 gm of moisture, 4.5 gm of protein, 41.6 gm of fat, 3.6 gm of fibre, 13 gm of carbohydrate, 0.01 gm of calcium, 0.24 gm of phosphorus, 1.7 mg of iron, 444 kcal of energy, 0 µg of carotene, 0.05 mg of thiamine, 0.8 mg of niacin, 0.10 mg of riboflavin and 7 mg of ascorbic acid

71 Increased food volume in the stomach promotes pyloric emptying from the stomach, due to stretching of the walls of the stomach which stimulate myenteric reflexes lead to the increased activity of pyloric sphincter.

Table 2.3: The relation between seasonal and diurnal variations of Dosha

Vata Dosha	Shita Kala (cold season); Pravata (time of excess wind flow)	Gharmante (rainy season); Abhrakala (cloudy day)	Pratyusha (early morning)	Aparahna (afternoon)	Jirnante (after the digestion of food)
Pitta Dosha	Ushna Kala (hot or summer season)	Meghante (Sharat Ritu)	Madhyahna (mid noon)	Madhyaratri (mid night)	Jiryati Anne (during the digestion of food)
Kapha Dosha	Shita Kala (cold season)	Vasanta Ritu	Purvahna (early part of day)	Pradosha (early part of night)	Bhuktamatre (soon after the ingestion of food)

तिक्तोषणकषायाल्प रूक्षप्रमितभोजनैः।
धारणोदीरणनिशा जागरात्युच्चभाषणैः॥
क्रियातियोगभीशोक चिन्ताव्यायाममैथुनैः।
ग्रीष्माहोरात्रि भुक्तान्ते। प्रकुप्यति समीरणः॥

अ.हृ.नि. - 1/14-15

पित्तं कट्वम्लतीक्ष्णोष्ण पटुक्रोधविदाहिभिः।
शरन्मध्याह्न रात्र्यर्ध विदाहसमयेषु च॥ अ.हृ.नि. - 1/16
स्वाद्वम्ललवणस्निग्ध गुर्वभिष्यन्दिशीतलैः।
आस्यास्वप्नसुखाजीर्ण दिवास्वप्नातिबृंहणैः॥
प्रच्छर्दनाद्ययोगेन भुक्तमात्रवसन्तयोः।
पूर्वाह्णे पूर्वरात्रे च श्लेष्मा द्वन्द्व तु संकरात्॥

अ.हृ.नि. - 1/17-18

Dosha Kshaya Karana

व्यायामोऽनशनं चिन्ता रूक्षाल्पप्रमिताशनम्।
वातातपौ भयं शोको रूक्षपानं प्रजागरः॥76॥
कफशोणितशुक्राणां मलानां चातिवर्तनम्।
कालो भूतोपघातश्च ज्ञातव्याः क्षयहेतवः॥77॥

Ca.Su. – 17/76-77

Vyayama: Excess[72] exercise. Excess amount of exercise is responsible for the vitiation of *Vata Dosha*. This is responsible for the decrease of *Pitta* and *Kapha Dosha* simultaneously.

Anashana: Performing fasting.[73] Fasting frequently is responsible for the depletion of body tissues as well as *Pitta* and *Kapha Dosha* from the body.

Chinta: Excessive thinking,[74] is responsible for the depletion of *Pitta* and *Kapha* from the body.

Ruksha Bhojana– Consumption of food substances having *Ruksha* quality. The substances having *Ruksha* quality frequently responsible for the vitiation of *Vata Dosha*. This in turn leads to the depletion of *Snigdha* (unctuousness) from the body. Whereas *Snigdha* (unctuousness) is the specific quality of *Kapha* and *Pitta Dosha*. Thus, there will be depletion of *Kapha* and *Pitta Dosha* from the body. The following are the effects observed when the person consumes unctuous substances adequately. These effects are not observed in the people who consume *Ruksha Ahara*.

The effects of Snigdha (unctuous) Ahara

स्निग्धश्नीयात्; स्निग्धं हि भुज्यमानं स्वदते, भुक्तं

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72 The mechanism of exercise is explained earlier in the present chapter.

73 Mechanism of fasting explained as follows:
The body tissues are utilising carbohydrates for regular metabolism when compared to fats and proteins. Normally, human body possess a few 100 gm of carbohydrates (glycogen in liver and muscle) and this amount is used by the body by half a day. After this, fat mobilisation and digestion starts. After the digestion of fats, protein digestion starts.
Protein depletion starts in 3 phases: rapid depletion at first, slower depletion in the middle phase and rapid depletion shortly before birth.

74 Mechanism of thinking is already explained in the context of *Vata Prakopaka Karana* as per *Sushruta*. Reading a book increases the blood flow in the visual areas of the occipital cortex and in the language perception area of temporal cortex. It is also being said that the number of capillaries are highest in the brain where the metabolic needs are greatest and glucose is the only nutrient utilised by the brain cells unlike fats and proteins

चानुदीर्णमग्निमुदीरयति, क्षिप्रं जरां गच्छति, न्द्रियाणि, बलाभिवृद्धिमुपजनयति, वर्णप्रसादं वातमनुलोमयति, शरीरमुपचिनोति, दृढीकरोती चाभिनिर्वर्तयति; तस्मात् स्निग्धमश्नीयात्॥2॥ Ca.Vi. 1/25-2

- ⇨ Proper perception of taste
- ⇨ Enhances the digestive fire
- ⇨ Quick digestion of food
- ⇨ Proper downward movement of *Vata*
- ⇨ Nourishment of the body
- ⇨ Improves the functioning of *Indriya*
- ⇨ Enhances the strength of the person
- ⇨ Improves the complexion of the body

The above said effects will be reduced or completely absent in the persons who consume *Ruksha Ahara*.

Alpa Bhojana– consumption of very little amount of food. This is responsible for the little formation of *Dosha* in the body. Suppose, if the person takes little amount of food having little amount of salt leads to the less formation of *Pitta* and *Kapha Dosha* in the *Koshtha* in the individual.

The ill effects produced due to less food intake are as follow

तत्र हीनमात्रमाहारराशिं बलवर्णोपचयक्षयकरमतृप्तिकरमुदावर्तकरमनायुष्यवृष्यमनौजस्य शरीरमनोबुद्धीन्द्रियोपघातकरं सारविधमनमलक्ष्म्यावहमशीतेश्च वातविकाराणा-मायतनमाचक्षते, Ca.Vi. – 2/7

- ⇨ Reduces the strength, complexion, nourishment of the individual
- ⇨ Reduces the satiety of the individual
- ⇨ Causes the *Udavarta* (reverse movement of *Apanavata* in *Pakvashaya*)
- ⇨ Reduces the life span of the individual

- ⇨ Causes ill effects to the body, mind and *Indriya*
- ⇨ Causes 80 types of *Vataja Nanatmaja Vikara*

Pramitashana:- consumption of food substances having only one *Rasa*. The ideal food intake accepted by *Ayurveda* is consumption of food substances having all six *Rasa*. Thus, consumption of only one *Rasa* is responsible for vitiation of one *Dosha* and depletion of other *Dosha*. For example, if the person is consuming the substances having only *Madhura Rasa*, then we can have the depletion of *Pitta* and *Vata Dosha* in the body.

Exposure to *Vata* or wind for longer duration– exposure to cold wind is especially responsible for the peripheral vaso constriction, thus responsible for the *Vata* vitiation, thus there will be depletion of *Pitta* and *Kapha* in the body.

Exposure to *Atapa* (sunlight) for longer duration[75] – exposure to sunlight is responsible for the vitiation of *Pitta Dosha* in the body, thereby there will be depletion of *Kapha Dosha* in the body.

Bhaya– residing in fearful situations for long time, when the person is exposed to such fearful situations, there will be improper digestion of food, leads to depletion of body tissues.

कामक्रोधलोभमोहेर्ष्याह्रीशाकमानोद्वेगभयोपतप्तमनसा वा यदन्नपानमुपयुज्यते, तदप्याममेव प्रदूषयति॥8॥
भवति चात्र-
मात्रयाऽप्यभ्यवहृतं पथ्यं चान्नं न जीर्यति।
चिन्ताशोकभयक्रोधदुःखशय्याप्रजागरैः॥9॥

Ca.Vi. – 2/8-9

Shoka– grief is responsible for improper digestion of food, thereby there is less formation of *Dosha* and *Dhatu*. Thus, there will be depletion of *Pitta* and *Kapha Dosha* in the body.

G K [75] When the person is exposed to excess heat or hot atmosphere, with hot and humid weather in particular, the person will have clinical features such as extreme weakness, exhaustion, headache, dizziness, nausea, profuse sweating, confusion, staggering gait, collapse and loss of consciousness. In this, most of the features are related to hypovolemia.
Apart from the increase in the heat due to the environment, in the body tissues, there will be doubling of the rates of all intracellular chemical reactions, further adding more heat to the already increased heat in the body

Rukshapana– consumption of liquids having *Ruksha Guna* such as *Madya*. This is responsible for the depletion of *Kapha Dosha* in the body.

Prajagarana– frequent awakening at night time, this is responsible for the increase of *Ruksha Guna* in the body. Thus, there may be the depletion of *Pitta* and *Kapha Dosha* in the body.

Ativartana* of *Kapha, Shonita, Shukra, Mala* or *Purisha– excess expulsion of phlegm, blood, semen or faecal matter. This is responsible for the depletion of *Pitta* and *Kapha Dosha* in the body.

Kala– time especially *Adana Kala* (*Shishira, Vasanta* and *Grishma Ritu*) and *Vardhakya* (old age). This may be responsible for the depletion of *Pitta* or *Kapha Dosha* in the body.

Bhutopaghata: *Pishachadyupaghata* – affliction of the body by *Pishachi* etc

All the factors are responsible for the increase of *Vata Dosha*. That means there will be the decrease of *Pitta* and *Kapha Dosha*.

अत्र वातक्षयहेतुर्नोक्तो विलक्षणत्वात्, स चाचिन्तनदिवास्वपनादिर्ज्ञेयः; किंवा, अनशनात् किट्टाभावः, ततश्च किट्टरूपस्य वातस्याप्यनुत्पादात् क्षयो ज्ञेयः॥76॥ Ca.Su. – 17/76-77

Chakrapani has given the causative factors for the decrease of *Vata Dosha*.

Achintana– not at all thinking. It is being said that *Chintana* (thinking) is responsible for the increase of *Vata*. Thus, having no thinking at all will be responsible for the decrease of *Vata Dosha* in the body.

Divasvapna– sleeping during day time. This is responsible for the increase of *Snigdha* (unctuous) *Guna* from the body in turn responsible for the decrease of *Ruksha* (dry) *Guna* from the body. Thus, there will be decrease of *Vata* in the body. The description of *Divasvapna* and its effect is explained earlier in the same chapter.

Anashana– fasting. This is responsible for the absence of *Kitta* portion from the *Ahara*, thereby less formation of *Vata Dosha* from *Pakvashaya* during *Tritiya Avastha Paka*.

Special note: To explain the *dos* and *donts* in case of assessment of disease and management of the diseased individual, you need to know the *Nidana* responsible for the disease manifestation. It is stated that the first line of the management in any of the disease is avoiding the consumption of *Nidana*.

सङ्क्षेपतः क्रियायोगो निदानपरिवर्जनम्। Su.Ut. – 1/25

- ⇨ It is easy to learn the *Shlokas* told by *Tisatacharya* available in *Madhukosha* commentary of *Madhava Nidana*.

Dosha Vriddhi and Kshaya Lakshana

Learning objective:

- ⇨ If one knows the *Vriddhi* and *Kshaya Lakshana*, then you can easily identify the *Dosha, Dhatu* and *Mala* affected in the individuals.
- ⇨ It is also easy to predict the degree of *Dosha, Dhatu* and *Mala* involved in the same individuals.
- ⇨ The identification of *Vriddhi Lakshana* of *Dosha* will be helpful in the diagnosis of the disease.
- ⇨ The identification of *Vriddhi* and *Kshaya Lakshana* of *Dosha, Dhatu* and *Malas* will be helpful in the appropriate management of the diseased individuals.

As everybody knows that *Dosha, Dhatu* and *Malas* are constituting the base of living beings. Any imbalance in any one or more of the above may result in the abnormal functioning of the body which can be identified in the patients easily. As far as abnormalities of *Dosha* are concerned, it is only the symptoms observed during the *Prakopa* stage is of clinical significance. Symptoms of decrease of *Dosha* can lead to vitiation of other *Dosha*. For example, if there is *Kapha* in decreased stage, then one can see the increase of the *Vata dosha* in the body. That is why, we have to more stress on the increased state of the *Dosha* during the analysis of the pathology of any disease. In this section, we have discussed the symptoms of *Dosha* observed during the increase as well as decrease of the *Dosha* in the body.

दोषाः प्रवृद्धाः स्वं लिङ्गं दर्शयन्ति यथाबलम्।
क्षीणा जहति लिङ्गं स्वं, समाः स्वं कर्म कुर्वते॥62॥
Cha.Su. 17/62

As per *Charaka*, there will be severe symptoms if there is increase of *Dosha* in the body and there will mild symptoms or reduced symptoms if there is decrease of the *Dosha* in the body and the *Dosha* in their normalcy, will be responsible for the maintenance of the in the body.

References

- ☐ *Ashtanga Hridaya Sutrasthana* 11th chapter
- ☐ *Ashtanga Sangraha Sutrasthana* 19th chapter
- ☐ *Susruta Samhita Sutrasthana* 15th chapter
- ☐ *Caraka Samhita Sutrasthana* 17th chapter

Vata Dosha Vriddhi and Kshaya Lakshana

..................................वृद्धस्तु कुरुतेऽनिलः।
कार्श्यकाष्र्ययोष्णकामत्वकम्पानाह शकृद्ग्रहान्॥
बलनिद्रेन्द्रियभ्रंशप्रलापभ्रमदीनताः। अ.हृ.सू. - 11/5-6

Vata Vriddhi Lakshana include

- ⇨ ***Karshya*** (leanness of the whole or part of the body or weight loss)[76]
- ⇨ ***Karshnya*** (blackish discolouration[77] of the whole or part of the body)
- ⇨ ***Ushnakamitva*** (liking towards the hot substances and dislike towards the cold substances) such as hot coffee in touch or alcoholic beverages which are hot in *Virya*
- ⇨ ***Kampa*** (involuntary movements)[78]
- ⇨ ***Anaha*** (distension of the abdomen)[79]
- ⇨ ***Shakrid graha*** (constipation)[80]
- ⇨ ***Bala bhramsha*** (reduced or loss of strength)[81]
- ⇨ ***Nidra Bhramsha*** (reduced or loss of sleep)[82]
- ⇨ ***Indriya Bhramsha*** (reduced or loss of functions of *Jnanendriya* and *Karmendriya*)
- ⇨ ***Pralapa*** (irrelevant speech)[83]

GK

76 Weight loss is attributable to inadequate food intake, disturbances in absorption or retention. During the process of weight loss, depletion of carbohydrates, fats and proteins will occur sequentially.

77 Blackish discolouration of the skin of part or whole body is seen in case of lack of blood circulation in the lower limb. This is associated with shininess of the skin, loss of body hairs and absent peripheral pulsations

78 Chorea, athetosis, hemiballismus, habit spasms and tics, tremors, myoclonus are some examples of involuntary movements which may indicate the involvement of either midbrain or basal ganglia

79 Distension of the abdomen is usually the sequel of constipation. This can be determined by generalised swelling of the abdomen associated with increased peristaltic sounds (borborygmi) in the abdominal region

80 The term constipation refers to slow movement of feces through large intestine. This is associated with large quantities of dry, hard feces in the descending colon because of over absorption of water from large intestine. Functional cause of constipation is irregular bowel habits developed through a lifetime of inhibition of normal defaecation reflexes.

81 Motor control system can be damaged by the common abnormality called stroke. This is caused by either ruptured blood vessel or by thrombosis of the one of the arteries supplying the brain. This result in loss of blood supply to the cerebral cortex or to the corticospinal tract.

82 Prolonged wakefulness is often associated with progressive malfunction of thought processes and sometimes even lead to abnormal behavioural activities. At the end of a prolonged wakeful period, there will be increased sluggishness of thought. In addition, the person can become irritable or even psychotic after forceful wakefulness.

83 Speech disturbances can be either fluent speech and non fluent speech. In fluent speech, the person will be speaking normally or more than normal, whereas in non fluent speech, the person will not speak or speak very less. Fluent speech is seen parietal lesions and non fluent speech is observed in frontal lesions of the brain

- ⇨ ***Bhrama*** (giddiness)[84]
- ⇨ ***Dinata*** (ill look)

Vata Kshaya Lakshana include

लिङ्गं क्षीणेऽनिलेऽङ्गस्य सादोऽल्पं भाषितेहितम्।
संज्ञामोहस्तथा श्लेष्मवृद्ध्युक्तामयसंभवाः॥ अ.हृ.सू.- 11/15

- ⇨ ***Angasada*** (sluggish activity of body parts);[85]
- ⇨ ***Alpa Bhashita and Ihita*** – reduced speech and physical activities;
- ⇨ ***Sanjnamoha*** (unable to make any decisions or altered state of consciousness);[86]
- ⇨ ***Shleshmavriddhyukta Amaya***– manifestation of the diseases due to *Kapha Prakopa*[87]

Pitta Vriddhi and Kshaya Lakshana

Pitta Vriddhi Lakshana include

पीतविण्मूत्रनेत्रत्वक्क्षुत्तृड्दाहाल्पनिद्रताः।
पित्तं ....॥ अ.हृ.सू. - 11/7

- ⇨ *Pita* vit (yellowish discolouration of faecal matter);[88]
- ⇨ **Pita mutra** (yellowish discolouration of urine);
- ⇨ ***Pita*** netra (yellowish discolouration of eyes);
- ⇨ ***Pita*** twak (yellowish discolouration of skin);
- ⇨ ***Kshut* and *Trit*** (excess hunger[89] and thirst);
- ⇨ ***Daha*** (burning sensation);[90]

GK

84 Most important diagnostic tool in the analysis of giddiness is detailed history of the patient is necessary regarding the meaning of giddiness. Whether is it related to syncopal attack or sensation of spinning? If either of these is affirmed, then thorough neurological examination is done to evaluate presyncope or vestibular dysfunction or hyperventilation.

85 *Angasada* and *Alpa Ihita* refers to the increase of *Guru Guna* in the body.

86 Consciousness may be altered in dysfunction of brain. The degree of unconsciousness is graded as *delirum*, stupor, semicoma and coma. Further, there is one more tool to analyse the degree of unconsciousness called Glasgow Coma scale (EMV score).

87 If you analyse the qualities of *Vata* and *Kapha Dosha*, most of the qualities are opposite except *Shita Guna*. That is the reason, if one observe the decreased *Lakshana* related to *Vata Dosha*, it indirectly implies that there is increase of *Kapha Dosha* in the body.

88 Yellowish discolouration of skin, urine, eyes and faecal matter (jaundice) is observed when there is increased concentration of bilirubin and biliverdin in the blood. In case of hepato biliary dysfunctions, yellowish discolouration is seen.
There are certain informations to be known in case of jaundice.
If the serum bilirubin is < 3 mg/ dl, then yellowish discolouration is not clinically detectable.
The earliest sign of jaundice is seen in ventral surface of the tongue.
Probable causes of jaundice are excess haemolysis, diseases of liver and gall bladder, disease of common bile duct, disturbance in relation to the biliary outflow
Other symptoms observed in clinical jaundice could be fever, pain in the right upper quadrant, steatorrhoea (fat in the faecal matter), lemon or dark yellow tinge of the skin, itching all over the body, bleeding per rectum. All these symptoms may not be observed in a single patient. These are seen depending upon the nature of the disease.

89 Hunger contractions are most intense in young, healthy people who usually have high degree of gastro intestinal tonus. They are usually greatly increased by the person's having lower than normal levels of blood sugar. When hunger contractions occur in the stomach, the person experiences mild pain in the pit of the stomach, called hunger pangs. Hunger pangs usually do not begin until 12 to 24 hours after the last ingestion of the food. In starvation, hunger pangs reach their greatest intensity in 3 to 4 days and gradually weaken in succeeding days.

90 Burning sensation occurs in two different mechanisms namely, in alimentary canal dysfunction and in neurological disturbances.
Alimentary canal dysfunction is mainly related to disturbance in stomach and duodenum. This can happen either due to erosion of gastroduodenal mucosa and decreased neutralisation of gastric acid by intes-

- ⇨ ***Alpanidrata*** (less sleep)[91]

Pitta kshaya lakshana include

पित्ते मन्दोऽनलः शीतं प्रभाहानिः॥ अ.हृ.सू. - 11/16

- ⇨ ***Mandanala*** (reduced digestive power);[92]
- ⇨ ***Sita*** (feeling of coldness); [93]
- ⇨ ***Prabhahani*** (loss of lustre)[94]

Kapha Vriddha and Kshaya Lakshana

Kapha Vriddha Lakshana include

..... **श्लेष्माग्निसदनप्रसेकालस्यगौरवम्।**

श्वैत्यशैत्यश्लथाङ्गत्वं श्वासकासातिनिद्रता:॥ अ.हृ.सू. - 11/7

- ⇨ ***Agnisadana*** (reduced appetite); [95]
- ⇨ ***Praseka*** (excess salivation);[96]
- ⇨ ***Alasya*** (laziness);[97]
- ⇨ ***Gouravam*** (heaviness);
- ⇨ ***Shaitya*** (feeling of coldness);[98]
- ⇨ ***Shvaitya*** (whitish discolouration);
- ⇨ ***Shlathangatva*** (loose or less compact body parts);[99]
- ⇨ ***Svasa*** (breathing discomfort);[100]

GK

tinal juices.
Neurological dysfunction is mainly due to the craving of the neurons because of the absence of nutrients, glucose in particular.

91 Prolonged wakefulness at night is often associated with progressive malfunction of thought processes, abnormal behavioural activities and Irritability.

92 In this condition, stomach fails to secrete hydrochloric acid. The pH of the gastric secretions will be more than 6.5 after maximal stimulation. This is leading to the hampered activation of pepsinogen to pepsin, thereby digestion in stomach will be reduced.
Another major pathological mechanism happens is lack of absorption of vitamin B12 due to absence of intrinsic factor secreted along with gastric secretion.

93 When the body is too cold, the temperature control system does following mechansims
1. Skin vasoconstriction through out the body
2. Pilo erection – i.e. hairs standing on the end also termed as goose bumps.
3. Increase in thermogenesis by various metabolic systems.
This is prior state where *Pitta Kshaya* can be seen.

94 When there is decreased function of Pitta, we may expect the decreased function of *Rakta Dhatu* too based on the concept of *Ashraya Ashrayi Bhava*. The following are the effects can be seen in case of *Rakta Kshaya* which may indirectly indicate decrease of *Bhrajaka Pitta* in the body.
1. Peripheral vaso constriction throughout the body
2. This will lead to cracks in the skin, loss of skin turgor gradually.

95 The description is available in the context of *Mandanala*.

96 Parasympathetic nervous stimulation causes increased secretion from parotid and submandibular glands leading to excess salivation.
Increased salivation is observed in irritant lesion of buccal mucosa, Parkinsonism, accompaniment of nausea, oesophageal obstruction, anxiety state. During this state, rate of formation of saliva may increase upto 20 fold. This is responsible for reconditioning of saliva in proportions of salts. Sodium chloride concentration rises ½ to 2/3rd of that of plasma and potassium concrentration rises 4 times that of *plasma*.

97 Both *Alasya* and *Gourava* are interlinked. When the person is having increase of *Guru Guna* (quality) due to consumption of *Masha* (blackgram) and sleeping in day time, we may get these symptoms frequently.

98 This is described in the context of *Shitatva* in *Pitta Kshaya Lakshana*.

99 This type of clinical presentation is specifically seen in joint effusions and in conditions of hypoproteinemia. In hypoproteinemia, there will be reduction in osmotic in the intravascular compartment occurs leading to the excess fluid accumulation in the interstitial compartment. This is responsible for the looseness of the body parts.

100 Dyspnoea or breathing discomfort is awareness of one's own breathing in the form of effortful breathing. This can occur because of

- ⇨ ***Kasa*** (cough); [101]
- ⇨ ***Atinidrata*** (excess sleep)[102]

Kapha kshaya lakshana include

.... **कफे भ्रमः।**

श्लेष्माशयानां शून्यत्वं हृद्द्रवः श्लथसन्धिता॥

अ.हृ.सू. - 11/16

- ⇨ ***Bhrama*** (giddiness);[103]
- ⇨ ***Shleshmashayam sunyatva*** (emptiness of the parts which are stated to be *Shleshmashaya* for example, *Amashaya* etc.);[104]
- ⇨ ***Hriddrava*** (feeling of beating of self heart);[105]
- ⇨ ***Slathasandhita*** (looseness or less compart joints of the body)[106]

Table 2.4: The relation between seasonal and diurnal variations of DoshaVata Vriddhi and Kshaya Lakshana

Vata Vriddhi Lakshana	Vata Kshaya Lakshana
Karshya (emaciation)	Angasada (sluggish movement of body parts)
Karshnya (blackish discolouration)	Alpa Bhashita (less voice production), Alpa Vaktva as per Sushruta
Ushnakamitva (liking towards warm or hot substances)	Alpa Ihita (less physical activity) Mandacheshtata as per Sushruta
Kampa (involuntary movements), Gatra Sphurana as per Sushruta	Sanjnamoha (altered state of consciousness), Mudhasamjnata as per Sushruta
Anaha (distension of the abdomen)	Shleshma Vriddhi Ukta Amaya Sambhava (diseases due to vitiation of Kapha will be manifested)

GK

1. Disease of bronchi, lungs, pleura or thoracic cage
2. Disease of heart
3. Due to the increased demand of oxygen such as high altitudes, anemia or metabolic acidosis (diabetes mellitus or uremia)
4. Psychogenic dyspnoea

In case of disease of lungs, heart, bronchi, one can get breathlessness associated with presence of secretions in the lower respiratory passages. This may be suggestive of abnormal *Kapha Dosha* in the body.

101 Cough is the sequel of pathological process happening in the cardio respiratory passages or as a result of entry of food substances into respiratory passages from alimentary canal or due to the activation of medulla oblongata.
Productive sputum due to any of the above said causes is mostly observed in case of *Kapha* dominant diseases.

102 In obese people, the people will be having the collapse of upper airways during sleep due to the fall in the tone of airway dilator muscles. It is often associated with loud snoring, daytime sleepiness and behavioural changes.
Sleep is responsible for
1. changes in muscle tone – hypotonia of limb muscles and increase in tone of neck and back muscles
2. somatomotor and autonomic changes – closed eyes, lower heart rate and BP. This will lead to reduced metabolism in the body and in turn leads to weight gain too.

103 Different words are used to describe giddiness such as lightheadedness, faintness, spinning or dizziness. This is specifically seen in peripheral neuropathy, myelopathy, Parkinsonism or cerebellar ataxia. In simple terms, it is known as disturbed ambulation.

104 Emptiness of the joint is usually associated with cracking and creaking type of sound. Minor clicks in the finger joint by passive hyperextension and in some cases during the movement of scapula and shoulder joint.

105 When the person is presented with such type of complaint, then we can say that the person is having palpitation. In this situation, the person may complain of bumping or throbbing or pounding or fluttering in the chest. This can be seen in the person suffering from hyperthyroidism or organic heart disease or anxiety state or in case of rhythm disturbances.

106 This type of presentation can be seen in when there is friction between joint surfaces are present, for example, when the person is suffering from degenerative joint disease pertaining to knee joint.

Vata Vriddhi Lakshana	Vata Kshaya Lakshana
Shakrit Graha (constipation), Gadha Varchatva as per Sushruta	Apraharsha (Dissatisfaction)
Bala Bhramsha (loss of strength), Alpabalatva as per Sushruta	
Nidra Bhramsha (loss of sleep), Nidranasha as per Sushruta	
Indriya Bhramsha (loss of function of Indriya)	
Pralapa (irrelevant speech)	
Bhrama (giddiness)	
Dinata (ill look)	
Vak Parushya (roughness in the voice)	

Table 2.5: Pitta Vriddhi and Kshaya Lakshana

Pitta Vriddhi Lakshana	Pitta Kshaya Lakshana
Pita Vit (yellowish discolouration of faecal matter) also told by Sushruta	Mandoshmata (slight rise in body temperature or slight reduction in body temperature) one is due to the increase of Ushna Guna and other is due to the increase of Drava Guna
Pita Mutra (yellowish discolouration of urine) also told by Sushruta	Prabhahani (loss of lustre), Nishprabhata as per Sushruta (lack of lustre)
Pita Netra (yellowish discolouration of eyes) also told by Sushruta	Mando Anala (reduced digestive fire)
Pita Tvak (yellowish discolouration of skin)	Shita (abnormal cold perception)
Ati Kshudha (excess appetite)	
Ati Trishna (excess thirst)	
Daha (excess burning sensation)	
Alpa Nidrata (less amount of sleep) also told by Sushruta	
Pitavabhasata (feeling of yellowishness of the body)	
Shita Kamitva (excess desire towards cold substances)	
Santapa (feeling of raised body temperature)	
Murcha (altered state of consciousness)	
Balahani (loss of strength)	
Indriya Dourbalya (poor functioning of Indriya)	

Table 2.6: Kapha Vriddhi and Kshaya Lakshana

Kapha Vriddhi Lakshana	Kapha Kshaya Lakshana
Shuklatva (excess whitish discolouration)	Bhrama (giddiness)
Shitatva (abnormal cold sensation)	Shleshmashayanam Shunyatva (emptiness of the organs which are the seats of Kapha Dosha)
Sthairya (firmness in body parts)	Hrid Drava (awareness of one's heart beat)
Gourava (heaviness of body parts)	Shlathasandhita (looseness of joints)
Avasada (sluggish activities of the body)	Rukshata (increase of Ruksha Guna in the body)
Tandra (drousiness)	Antardaha (burning sensation in the body)
Nidra (excess sleep), Atinidrata (excess sleep) as per Vagbhata	Trishna Daurbalya
Sandhi and Ashti Vishlesha (looseness of Sandhi and Asthi)	Prajagarana (awakening at night time)
Agnisadana (poor digestive function)	
Praseka (excess salivation)	
Alasya (laziness)	
Shlathangatva (looseness of body parts)	
Shvasa (breathing discomfort)	
Kasa (cough)	

Table 2.7: Relation between presenting complaint and Dosha vitiation

Presenting complaint	Dosha involved
Constipation	Vata increase
Loss of sleep	Vata or Pitta increase
Excess salivation	Kapha increase
Dry cough	Vata increase
Involuntary movements	Vata increase
Headache in midnight	Pitta increase
Burning sensation in epigastrium	Pitta increase
Breathlessness	Kapha increase
Presence of pus in lower limb	Pitta and Kapha increase
Backache radiating to lower limb	Vata increase
Loss of consciousness	Tridosha increase
Skin lesion	Tridosha increase
Colicky abdominal pain	Vata increase
Loose stools	Vata increase
Mucus mixed stools	Vata and Kapha increase
Burning micturition	Pitta increase
Acute retention of urine	Vata increase
Loss of movement	Vata increase
Sensory impairment	Vata increase

Clinical pearls

- ⇨ **41 years old male** individual having an occupation of mason is presented with pain in the low back from past 2 days, pulling type, radiating to the right lower limb, severe pain, worsening, aggrevating on lifting heavy weight, bending forward, coughing and getting relieved by taking rest and medications. If it is analysed, *Vata Dosha* is afflicted in the course of the history. *Bharaharana* (lifting weight) might be the probable cause.
- ⇨ **37 years old male** individual having an occupation of cashier in the hotel, irregular on diet is presented with pain in the epigastric region from past 15 days, which is of burning type, radiating towards the neck, aggrevating by taking the spicy substances and oily items and getting relieved by taking the antacids. This is associated with sour eructations. On analysis, it can be inferred that the patient is having the dominance of the *Pitta Dosha* in the body.
- ⇨ **12 years old girl**, a student, is presented with headache in the frontal region from past 5 days and cough from past 3 days. This was initially dry cough followed by copious amount of whitish coloured sputum. This was observed more in the early morning time. This may indicate the dominance of *Kapha Dosha* in the body.
- ⇨ **51 years old female** individual is presented with pain in right hypochondriac region for the past 3 months, non radiating, pricking type, mild pain, associated with swelling around both feet from the past 30 days observed more oftenly in the evening time. The probable *Dosha* involved could be *Kapha Dosha*. The association of *Vata Dosha* is also present.
- ⇨ **45 years old male** patient is presented with pain in right hypochondriac region for the past 20 days, non radiating, pricking type, mild pain, associated with yellowish discolouration of eyes, tongue and skin for past 15 days. In this situation, the probable *Dosha* involved could be *Pitta Dosha* and association of *Vata Dosha* during the pathogenesis.

Dosha Prakopa Karma

Vata Prakopa Karma:

स्रंसव्यासव्यधस्वापसादरुक्तोदभेदनम्।
सङ्गाङ्गभङ्गसंकोचवर्तहर्षणतर्षणम्॥

कम्पपारुष्यसौषिर्यशोषस्पन्दनवेष्टनम्।
स्तम्भः कषायरसता वर्णः श्यावारुणोऽपि वा॥
कर्माणि वायोः ....॥

A.Hr. Su. – 12/49, 50

Srasmsa – ptosis or dislocation

Vyasa – dilatation

Vyadha – pain similar to the feeling of discomfort similar to the discomfort as if beaten by the stick or hammer

Svapa – numbness

Sada – sluggish movment of body parts

Ruk – pain

Toda – pricking type of pain

Bhedana – tearing type of pain

Sanga – obstruction

Anga bhanga – muscular pain

Sankocha – contractures

Varta – rounded swelling

Harshana – horripulation

Kampa – involuntary movements

Parushya – roughness of the body parts

Soushirya – porosity of the bones

Shosha – dryness of the body parts

Spandana – abnormal pulsation of the body parts

Veshtana – feeling as if covered by the cloth or other material

Stambha – stiffness

Kashaya rasatva – astringent taste in the mouth

Shyava Varna – blackish discolouration

Aruna Varna – reddish discolouration

The terms *Sramsa* and *Bhramsha* refers to ptosis and dislocation respectively. This pathological mechanism occurs due to general wasting of muscles, overwork or repeated forceful contractions for a variable period will result in the inefficiency of muscles. The outcome is either slight dislocation or severe dislocation. Slight dislocation is termed as *Sramsa* which occurs in eyelids, stomach, liver or kidneys etc. severe dislocation is termed as *Bhramsha* and it occurs in joints, kidneys etc. If the organ is near the external orifice, it will cause prolapse in case of uterus, rectum.

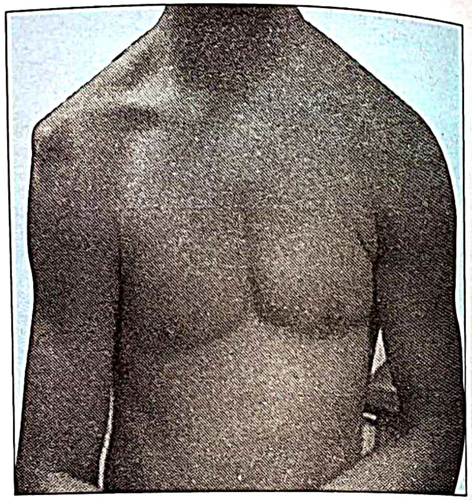

Fig 2.1 Dislocation of left shoulder joint

***Vyasa* (dilatation):** This pathological mechanism is observed in hollow organs. This refers to the increase in the internal diameter of the hollow organ. The probable cause of this pathological phenomenon is defect or weakness in the neuromuscular junction. This leads to the backflow of the obstructed contents in the hollow organs, thereby increases the diameter in the hollow organs. For example, dilatation of heart, aorta, urinary bladder etc.

***Vyadha* (pain similar to the discomfort as if beaten by the stick or hammer):** this type of discomfort is seen when the person falls during running race or in case of sports injuries without external wound such as muscular sprain.

***Svapa* (numbness):** This pathological mechanism is seen in the persons suffering from leprosy or in case of abdominal surgeries or in case of neurological manifestations. In case of leprosy or in case of transverse myelitis, the sensory part of nervous system will be afflicted, in case of abdominal surgeries, motor part of the nervous system will be afflicted and in case of cerebro vascular accident, depending upon the location of the lesion and nature of the lesion, numbness will be presented in the patient.

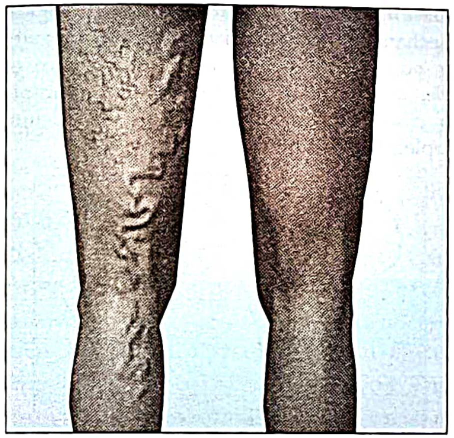

Fig 2.2: Varicose veins on left lower limb

Sada (sluggish movement): this pathological mechanism will be observed in the patients who are having the increase of *Laghu* (lightness) quality in the body. For example, in the patient who is suffering from diarrhoea where in the patient passes loose stools for more than 20 times, then he will be having sluggish movement of different parts of the body.

***Ruk* (discomfort):** this mechanism occurs due to the aberration of the neuro-muscular activity. This is responsible for various kinds of discomfort which are collectively called as *Ruk*. It comprises

- ⇨ *Toda* (pricking type of pain): in acute inflammation
- ⇨ *Bheda* (tearing type of pain): in case of accumulation of pus in the body
- ⇨ *Cheda* (pain resembling the discomfort similar to the one caused by cutting instrument)
- ⇨ *Pidana* (squeezing or twisting type of pain): this type of pain observed when the person is having severe abdominal diseases such acute diarrhoea or in chronic constipation
- ⇨ ***Angabhanga* (muscular pain):** this type of pain felt after excessive exercise.
- ⇨ ***Veshtana***: (discomfort): this type of pain resembles a feeling of being compressed from all sides

***Sanga* (obstruction):** This pathological mechanism can occur if there is *Vyasa* (dilatation) or *Stambha* (stiffness) in any part of the body. The movements in the hollow organs become sluggish or completely stopped causing accumulation and stagnation of fluid and gaseous substances and leading to the obstruction of their normal passages. *Stambha* can also occur due to the adhesions occur in the alimentary canal thus hamper the normal movements.

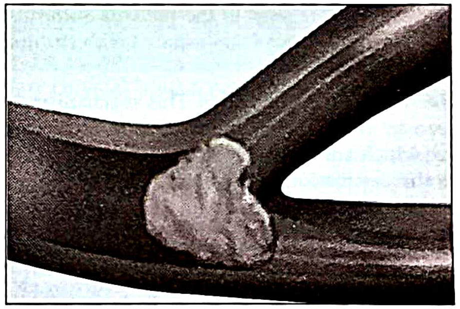

Fig 2.3: Obstruction at the blood vessel

***Sankocha* (contractures):** This mechanism is responsible for the constriction of the muscles or organs of the affliction. The fibrous tissue that replaces muscle tissue during degeneration atrophy tends to continue the shortening of the muscular tissue when degeneration persists for several months. It may occur because of abnormal increase of *Ruksha Guna* in the body. It can occur in the patients suffering from

Pakshaghata from longer duration or *Amaja Anaha* (distension of the abdomen due to the defect in *Amashaya* such as pyloric stenosis or *Udavarta* (in the patient suffering from chronic constipation).

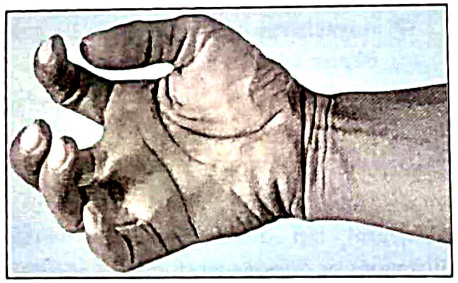

Fig 2.4: Development of contracture in right upper limb

***Varta* (globular swelling):** this mechanism occurs due to the increase of *Ruksha Guna* in the body. The increase of *Ruksha Guna* happens because of the reduction of *Snigdha Guna* in the body, thereby leading to the formation of globular swelling. This is observed in the patients suffering from *Gulma* (any chronic condition related with abdominal swelling) and this can also be seen in the patients suffering from chronic *Udavarta* (associated with chronic constipation).

***Harshana* (horripulation):** This mechanism is seen in skin where the contraction of erector pili which are connected to hair follicles leading to the depression of the skin over their origin and elevation of the skin immediately around the hair. This gives the appearance of goose bump. This is seen in cold atmosphere and in emotional reactions like fear, joy or sorrow etc.

***Tarshana* (thirst):** this pathological mechanism occurs when there is stimulation of sympathetic nervous system. The conditions such as fear and shock, there will be activation of sympathetic nervous system and inhibition of parasympathetic nervous system leading to the dryness of the mouth. Other causes such as running, climbing and talking in excess may also lead to the manifestation of thirst.

***Kampa* (involuntary movements):** Overexcitement of normal muscle or normal excitement of a weak muscle causes mild or severe, forceful and intermittent twitchings or contractions called as *Kampa*. This is observed in the persons suffering from cerebro vascular accident or extra pyramidal syndromes.

***Soushirya* (cavity formation):** This pathological mechanism occurs when there is a cavity or porosity happening as a consequence of *Dhatukshaya* (tissue depletion). For example in case of osteoporosis in case of calcium depletion in the body.

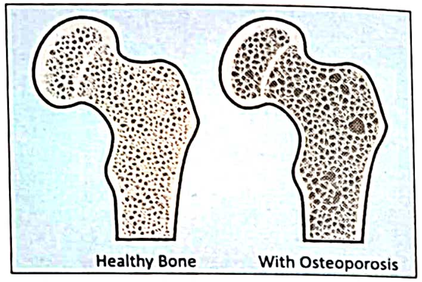

Fig 2.5: Images showing normal bone and bone of osteoporosis

***Shosha* (atrophy):** this pathological mechanism is seen in the states of *Dhatukshaya* as in the case of *Rajayakshma* and in old age and atrophy of any cause. For example, if the activities of the limb are stopped for a considerable amount of time, the person may develop disuse atrophy.

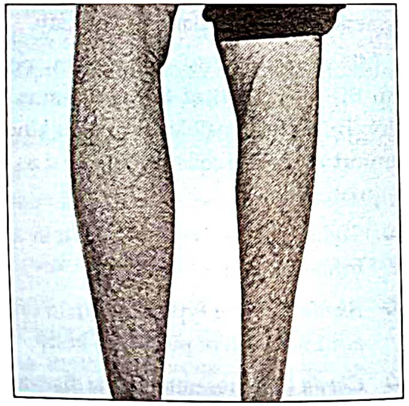

Fig 2.6: Images showing the normal lower limb and atrophied right lower limb

***Spandana* (abnormal pulsation):** This mechanism is seen in diseases of cardio vascular system. This is observed when the heart starts to pulsate abnormally. This is usually presented with abnormal awareness of one's own heart beat.

***Stambha* (stiffness)–** this mechanism is seen in the patients who are not utilising the limbs. This is usually seen in either neurological disease or musculo skeletal disease. For example, in the person who is presented with cerebro vascular accident, we can observe the stiffness of the affected limb in case of immobility.

***Kashayarasata*–** this is astringent taste perception observed in the mouth.

***Shyava* and *Aruna Varna*–** the term *Aruna Varna* refers to reddish discolouration and *Shyava Varna* refers to blackish discolouration. This discolouration is specifically seen in necrosis of the cells.

पित्तस्य दाहरागोष्मा पाकिता:।
स्वेद: क्लेद: स्रुति: कोथ: सदनं मूर्च्छनं मद:॥
कटुकाम्लौ रस: वर्ण: पाण्डुरारुणवर्जित:॥

***Daha* (burning sensation):** This pathological mechanism is seen in the stages of inflammation. It may also be felt in the sites of *Pitta Prakopa* such as eyes, palm and throat or in the entire body due to the *Ushna Guna* of *Pitta*.

***Raga* (redness):** This phenomenon is seen in the situation where in increased blood circulation observed at the site.

***Ushma* (raised body temperature):** this phenomenon is seen in the conditions where in local raise of body temperature is seen. The person having this pathological process, he will be presented with fever.

***Ushma* (raised body temperature):** this phenomenon is seen in the conditions where in local raise of body temperature is seen. The person having this pathological process, he will be presented with fever.

Pakita (pus formation): this phenomenon is seen in the conditions, where suppuration or pus formation.

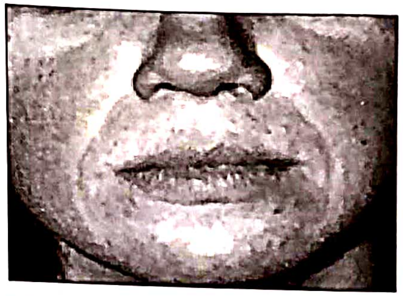

Fig 2.7: Image showing the reddish discolouration of the lips

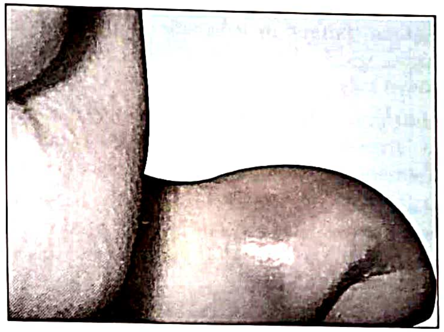

Fig 2.8: Image showing the pus accumulation in the finger

***Sveda* (excess sweating):** this is attributable to the excess activity of the tissues and peripheral vaso dilatation.

***Kleda* (sticky fluid):** this is quite different from *Sveda* (sweat). *Sveda* is more liquid in the form, whereas *Kleda* is more sticky fluid than *Sveda*. Part of the *Kleda* remains in the skin for longer as it is sticky in nature.

***Sruti* (oozing or discharge):** this is seen in the conditions where in peripheral vaso dilatation is observed.

***Kotha* (gangrene):** This is caused by rapid temporary or permanent obliteration or occlusion of blood vessels. This can be attributable to the increase of *Tikshna*, *Visra Guna* in the body.

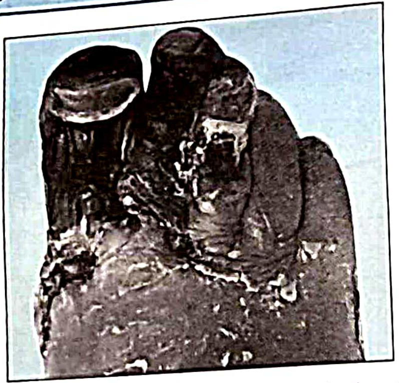

Fig 2.9: Image showing gangrenous changes in the toes of right lower limb

***Sadana* (fatigue or exhaustion)–** this kind of pathological process occurs in the conditions of neuro muscular weakness.

***Murchana* (fainting)–** this is attributable to altered state of consciousness wherein disorientation of person, time and place is seen.

***Mada* (intoxication)–** *Pitta* vitiated by bacterial or other toxins or by consumption of alcohol, one can observe mental dysfunction and this is being termed as *Mada*.

Katu and *Amla Rasatva* (abnormal taste perception i.e. of pungent and sour taste perception)

Abnormal discolouration (yellowish white or reddish discolouration)

श्लेष्मण: स्नेहकाङ्गिण्यकण्डू शीतत्व गौरवम्।
बन्धोपलेप स्तैमित्य शोफापक्त्यतिनिद्रता:॥
वर्ण: श्वेतो रसौ स्वादुलवणौ चिरकारिता।

***Sneha* (excess unctuousness):** this is seen in the conditions wherein the increase of *Snigdha Guna* is seen in the body. In conditions such as *Kaphaja Shotha*, and in discharges from eyes, ear this is abnormally increased.

Kathinya this pathological process occurs due to the abnormal increase of *Kapha Dosha*. it is also associated with the increase of *Vata Dosha* also.

***Kandu* (itching):** The *Kleda* and *Saratva* in the body is increased in the body. This will lead to the increase of *Kapha Dosha* in the body. This is seen in *Kushtha* and *Prameha*.

***Shitatva* (feeling of coldness):** This is attributable to the increase of *Shita Guna* in the body.

***Gourava* (a sensation of heaviness):** *Guru*, *Snigdha* and *Picchila Guna* is responsible for this type of clinical presentation.

***Bandha*:** The term Bandha refers to the obstruction to the channels.

***Upalepa*–** the term *Upalepa* refers to the sticky coating on the surface. It is found in the tongue in conditions like *Ajirna* or in case of *Dhamani Pratichaya*, a type of *Kaphaja Nanatmaja Vikara*.

***Staimitya*–** this is considered as abnormal feeling similar to that felt on wearing the wet skin of the animal (fresh from slaughter house)

***Shopha* (swelling or oedema):** Vitiated *Kapha Dosha* is the prime *Dosha* in this type of pathological process. This may of either pitting or non pitting type of oedema.

***Apakti* (indigestion):** this occurs due to the increase of *Snigdhata* and *Kledata* in the *Amashaya*, thereby leading to the hampered digestion of the ingested food.

***Atinidrata* (excess sleep):** this occurs due to the increase of *Guru*, *Snigdha* and *Picchila Guna* in the body. These are responsible for the sluggish movements of the body parts and hypofunctioning of body parts. This is also responsible for excess sleep.

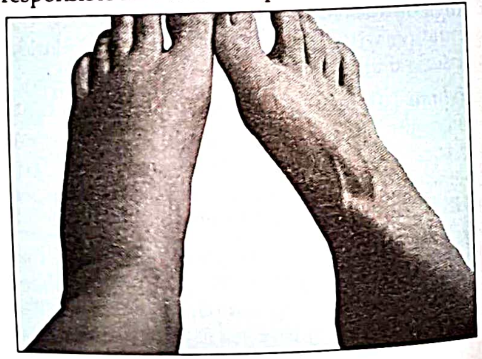

Fig 2.10: Image showing oedema of left foot

Shveta Varna (whitish discolouration) this is specifically observed in vitiation of *Kapha Dosha*.

***Svadu Lavana Rasa*–** when the person is having the increase of *Kapha Dosha* in the body, he may show abnormal perception of *Svadu* (sweet) and *Lavana* (salty) taste in the mouth

***Chirakarita*–** (slowly progressive): this is specifically seen in *Kapha* dominant diseases. This is attributable to the increase of *Manda* (slow in movement), *Guru* (heavy to digest) *Guna* in the body.

Few images to show the abnormal *Dosha* in the body:

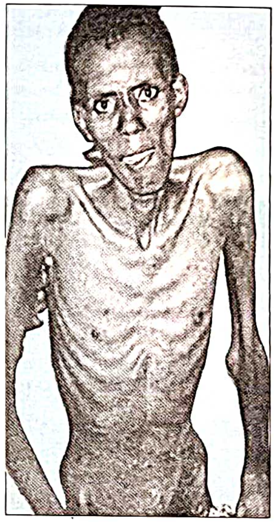

Fig 2.11: Karshya (Vata Vriddhi)

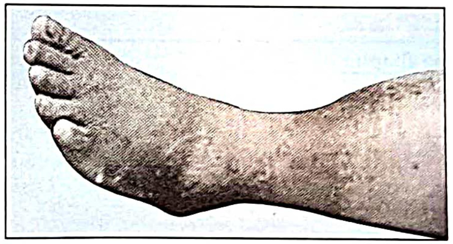

Fig 2.12: Karshnya (Vata Vriddhi)

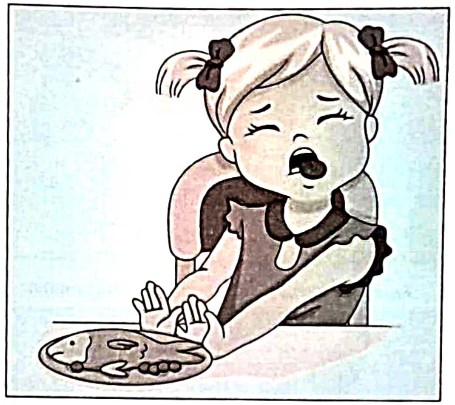

Fig 2.13: Aversion to take cold food substances

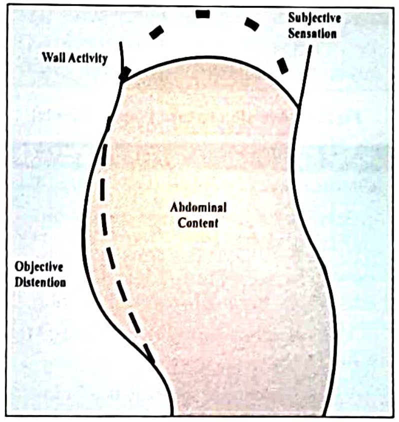

Fig 2.14: Distension of abdomen

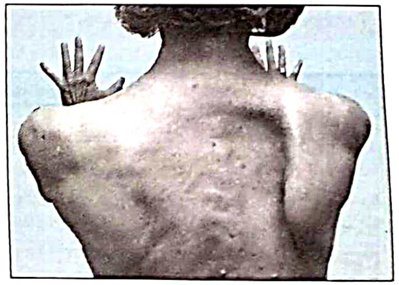

Fig 2.15: Mamsa Shosha (Vata Vriddhi)

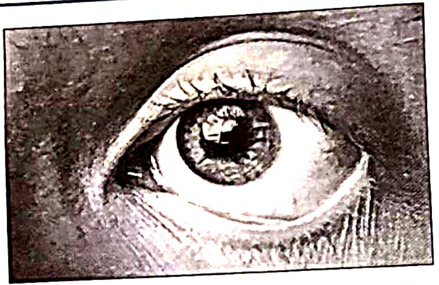

Fig 2.16: Yellowish discolouration (Pitta Vriddhi)

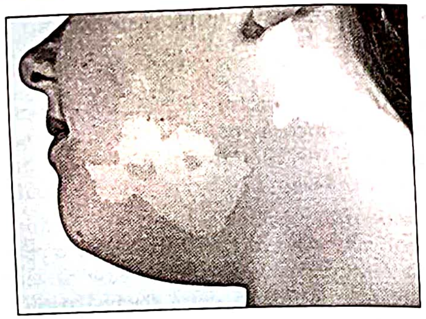

Fig 2.18: Whitish discolouration of the skin (Kapha Vriddhi)

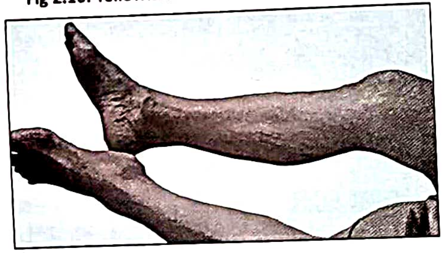

Fig 2.17: Aversion to take (Kapha Vriddhi)

Chapter Resources

1. *Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha* and *Ashtanga Hridaya* excerpts
2. Textbook of physiology by Arthur CGuyton and John E Hall, 11th Edition, Saunders publication, 2006
3. Best & Taylor's Physiological basis of medical practice by O P Tandon & Yogesh *Tripathi*, 13th edition, Wolters-Kluwer publication, 2012
4. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
5. Savill's system of clinical medicine, revised and edited by E C Warner, 14th Edition, CBS Publishers & Distributors, New Delhi, 1998
6. The Merck's Manual by Robert S Porter & Justin L *Kaplan*, Merck Sharp & *Dohme* Corp, 2011
7. Textbook of diet and nutrition, MS Svaminathan, 5th edition, reprint, 1996

Key points of the chapter

- ⇨ सङ्क्षेपतः क्रियायोगो निदानपरिवर्जनम्। Su.Ut. – 1/25; the above verse given by Susruta highlighting the importance of Nidana in clincal practice. If one follows above said regimen, the chances of recovery is rapid in most occasions and maintenance of the health can be possible.
- ⇨ First of all, this chapter highlights the importance of Rasa with Panchamahabhuta composition and its relation with *Dosha* vitiation
- ⇨ Schematic representation of different *Guna* increase and its relation with vitiation of *Dosha* is being explained
- ⇨ Individual explanation of *Nidana* (etiological factor) for the vitiation of single *Dosha* along with descriptions of *Madhukosha* commentary of *Madhava Nidana* and *Sushrta Samhita* is seen along with current understanding
- ⇨ The causative factors for the decrease of leading to the decrease of the *Dosha* is also being highlighted.
- ⇨ This highlights the functions of abnormally increased or decreased functions of *Dosha* along with *Prakopa Karma*.
- ⇨ This chapter contains clinical features of the increase and decrease along with certain demonstrable images to get the precise idea regarding the abnormal function in the body. This is also having the certain clinical application of the symptoms analysis for better understanding.

Probable questions to be asked in the examination

Long essay questions:

- ⇨ Explain the Dosha Prakopa and Kshaya Karanas of Vata, Pitta and Kapha and Vriddhi and Kshaya Lashana of Dosha
- ⇨ Explain Vata Dosha Prakopa and Kshaya Karanas and explain in brief about Vata Prakopa Karma
- ⇨ Explain Prakopa Karma of Vata, Pitta and Kapha

Short essays:

- ⇨ What are Vata Dosha Prakopa and Kshaya Karanas?
- ⇨ Explain Pitta Dosha Prakopa Karma
- ⇨ Explain Dosha Kshaya Karana
- ⇨ Write the Kapha Dosha Prakopa Karana
- ⇨ Explain Vata Vriddhi and Kshaya Lakshana
- ⇨ Write Vata Vriddhi, Kshaya and Sama Lakshana
- ⇨ Explain Vata Prakopaka Karana and Lakshana
- ⇨ Write in detail about Vata Prakopaka Lakshana
- ⇨ Vata Prakopaka Karana

Short answers:

- ⇨ Explain Vata Kshaya Karana
- ⇨ Pitta Vardhaka Ahara
- ⇨ Write Pitta Vriddhi and Kshaya Lakshana
- ⇨ Explain Pitta Vriddhi Lakshana
- ⇨ Explain Kapha Kshaya Lakshana
- ⇨ The questions may be asked for individual Dosha Vriddhi Lakshana or Dosha Kshaya Lakshana
- ⇨ Write Pitta Vriddhi Lakshana
- ⇨ Write Vata Prakopa Lakshana

MCQs

1. **Vak Parushya (roughness of voice) is indicative of**
   a. Vata vitiation;
   b. Pitta vitiation;
   c. Kapha vitiation;
   d. All of the above

   Answer - (a)
2. **Find the one which does not belong to the group.**
   a. Ikshu;
   b. Apupa;
   c. Prapura;
   d. Lavana Rasa substance

   Answer -(d)
3. **Consumption of Nishpava leads to the vitiation of**
   a. Vata Dosha;
   b. Pitta Dosha;

c. Kapha Dosha;
d. All of the above

Answer -(a)

4. **Frequent consumption of Kulattha (horse gram) leads to the vitiation of**

a. Vata;
b. Pitta;
c. Kapha;
d. All of the

Answer -(b)

5. **The Dosha dominance observed at 2.30 pm in a person of 63 years who has consumed food at 2 pm, will be**

a. Vata;
b. Pitta;
c. Kapha;
d. All of the above 9

Answer -(c)

6. **The increase of ....takes place when the person avoids sleep at night time.**

a. Snigdha;
b. Ruksha;
c. Vishada;
d. Tikshna

Answer -(b)

7. **Dosha dominance observed in an individual with 28 years of age is**

a. Vata;
b. Pitta;
c. Kapha;
d. All of the above

Answer -(c)

8. **Sankshepatah Kriyayogo Nidana Parivarjanam is the contribution of**

a. Sushruta;
b. Charaka;
c. Vagbhata;
d. Sharangadhara

Answer -(a)

9. **Hrid Drava is the Lakshana seen in the patients who are having**

a. Vata Kshaya;
b. Pitta Kshaya;
c. Pitta Vriddhi;
d. Kapha Vriddhi

Answer -(d)

10. **Staimitya is the Prakopa Karma seen in which of the following Dosha involvement?**

a. Pitta;
b. Kapha;
c. Vata;
d. None of the above

Answer -(b)

***

Asraya Asrayi Bhava

3

Learning objective of this chapter

- ⇨ By learning this concept, one can apply these informations in case of any new disease
- ⇨ If we do not know the Dosha involved in any new disease, by this concept, we can know the Dosha involved by knowing abnormal functions of Dhatu and Malas and vice versa
- ⇨ For every rule, there may be exceptions. In this concept, there is one exception i.e. Asthi and Vata are inversely related to each other.
- ⇨ To understand this concept better, one need to know the Vriddhi and Kshaya Lakshana of Dosha, Dhatu and Malas; concept of Shat Kriyakala.

Human body is composed of three basic pillars namely, *Dosha, Dhatu* and *Mala*. These three pillars are further divided into *Dosha* and *Dushya*. *Dosha* are the substances (*Dravya*) which will maintain the health of the human body if they are present in balanced proportions and if they are present in abnormal proportions, these will lead to the manifestation of various diseases. *Dushya* include *Dhatu* and *Mala*.

Dosha, Dhatu and *Mala* are further understood by two different terminologies i.e. *Ashraya* and *Ashrayi*. The word '*Ashraya*' refers to the *Dravya* which gives shelter or abode and '*Asrayi*' refers to the one which takes shelter in another *Dravya*. In this context, *Doshas* become the *Ashrayi* and *Dhatu* and *Malas* become the *Ashraya*.

तत्रास्थ्नि स्थितो वायुः पित्तं तु स्वेदरक्तयोः।
श्लेष्मा शेषेषु तेनैषामाश्रयाश्रयिणां मिथः॥
यदेकस्य तदन्यस्य वर्धनक्षपणौषधम्।
अस्थिमारुतयोर्नैवं प्रायो वृद्धिर्हि तर्पणात्॥
श्लेष्मणाऽनुगता तस्मात् संक्षयस्तद्विपर्ययात्।
वायुनाऽनुगतोऽस्माच्च वृद्धिक्षयसमुद्भवान्॥
विकारान् साधयेत् शीघ्रं क्रमाल्लङ्घन बृंहणैः।

अ.हृ.सू. 11/26-28

The concept of diagnosis of the disease is a very complex process sometimes. In some of the occasions, it is difficult to analyse the *Dosha* involved in the disease process and sometimes it is difficult to identify the *Dushya* in the disease process. The principle of *Ashraya* and *Ashrayi* can be applied if one has developed doubts regarding the involvement of either *Dosha* or *Dhatu* in the disease process.

Table 3.1: Relationship between Ashraya and Ashrayi

Dosha as Asrayi (Resident)	Dushya (Dhatu and Mala) as Asraya (Residence)	Relation between Asraya and Asrayi
Vata	Asthi	Inverse relation
Pitta	Sveda and Rakta	Direct relation
Kapha	Rasa, Mamsa, Meda, Majja, Sukra, Mutra, Purisha	Direct relation

As per rule, if there is increase in *Asraya* (residence), there will be automatic increase in the *Asrayi* (resident). If there is decrease in *Asraya*, there will be decrease in the *Asrayi*. For example, if one can identify the increase of *Sveda* and *Rakta*, one can infer straight away, that there is increase of *Pitta* and decrease of *Sveda* and *Rakta* implies the decrease of *Pitta* in the body. If one can identify the increase of *Mamsa, Meda, Majja* or *Mutra*, suggests the increase of *Kapha Dosha* in the body and the decrease of *Mamsa, Medas, Majja* or *Mutra*, one can infer that there is decrease of *Kapha Dosha* in the body.

But, this rule does not apply in case of *Asthi* and *Vata Dosha*. In other words to say, if one can identify the increase of *Asthi*, one will see the decrease of *Vata* in the body and if one can see the decrease of *Asthi*, one can see the increase of *Vata Dosha* in the body.

To understand this concept, let us discuss some examples. The knowledge of *Asraya* and *Asrayi Bhava* will be helpful in deciding the *Dosha* involved if one has the doubt regarding the involvement of *Dosha* by observing the *Lakshana* which indicate the abnormal functioning of *Dhatu* or vice versa.

For example,

- ⇨ **If 20 years old male patient** presents with the symptoms of *Atisara* (diarrhoea), it implies that the person is suffering from *Purisha Kshaya* (decrease of feces) in the body, thereby we can infer that there will be decrease of *Kapha Dosha* in the body. This information indirectly suggests that there is increase of *Vata Dosha* in the body. In this situation, the line of treatment is *Santarpana* which nourishes *Kapha Dosha*.
- ⇨ **If 30 years old male patient** is suffering from reddish discolouration of the skin or rashes, it implies the possible involvement of *Rakta Dhatu* and thus indirectly we can infer the possible involvement of *Pitta Dosha* vitiation in the body. Thus, one has to plan to pacify the vitiated *Pitta*.
- ⇨ **If 50 years old male patient** is presenting with blackish thick and dry discolouration of the skin, it suggests the involvement of *Rasa Dhatu Kshaya* and indirectly implies decrease in *Kapha Dosha* and simultaneous increase of *Vata Dosha* in the body.
- ⇨ **If 61 years old male patient** is presented with the history of weakness of the one limb or more limbs, we can infer the decrease of *Mamsa Dhatu* in the body and thereby decrease of *Kapha Dosha* and simultaneous increase of *Vata Dosha* in the body. Thus, the thorough analysis of *Lakshana* observed in the patient helps the clinician to diagnose the disease if doubt arises regarding the pathogenesis.
- ⇨ **71 years old male individual** is presented with non-radiating, pricking pain in right knee joint for the past 12 years, associated with crepitus, one can predict the degeneration of the joint, it implies the increase of *Vata* and decrease of *Asthi Dhatu* in the body. This is the perfect example for the exception of *Ashraya* and *Ashrayi* rule.

Clinical application

This helps us to plan the management of disease. If one can come to a conclusion that there is increase of *Asthi*, one has to plan the *Vata Prakopaka* therapy i.e. *Rukshana* or *Langhana* etc. If one sees the decrease of *Asthi*, one has to plan the *Vata Samaka* therapy i.e. *Snehana, Brimhana* etc. In case of *Rakta Vriddhi*, one has to plan the *Pitta Samaka* therapy as there will be *Pitta Prakopa* in the body. In case of *Mamsa Kshaya*, one has to plan the *Kapha Vriddhikara* therapy as there will be *Kapha Kshaya*. Similarly for other *Dushya* also, one has to decide the line of treatment based on above said principles.

Consumption of *Ruksha* etc substances will vitiate the *Vata Dosha*, but decrease *Asthi Dhatu*. The measures such as *Snehana* etc which will increase *Asthi* is responsible for the pacification of *Vata Dosha*. In case of *Asthi Vriddhi, Langhana* is planned as treatment principle. *Brimhana* is the management principle in case of *Vata Vriddhi*. But *Brimhana* is the line of treatment in case of *Asthi Kshaya* and *Langhna* is the line of treatment in case of *Vata Kshaya*. This is the opinion of *Hemadri* in the context of description of *Asraya Asrayi Bhava* in *Sutra Sthana* of *Ashtanga Hridaya*.

Chapter Resources

1. Ashtanga Hridaya, Charaka Samhita and Sushruta Samhita excerpts

Key points of the chapter

- ⇨ This chapter highlighted the meaning of Ashraya (the one which gives shelter) and Ashrayi (the one which takes shelter), its application i.e. Pitta Dosha is always proportionately associated with Rakta and Sveda. Kapha is proportionately associated with all other Dhatus except Rakta, Asthi and Sveda.
- ⇨ For every rule, there will be exception. In this concept also, there is an exception between Asthi and Vata Dosha with inversely proportionate relation.
- ⇨ This chapter helps in proper planning of the treatment when we are having confusion regarding Dosha and Dushya involvement in the manifestation of the disease. This is explained with clinical examples for a better understanding.

Probable questions may be asked in the examination

Short essays

- ⇨ Explain the concept of Ashraya Ashrayi Bhava with suitable examples

Short answers

- ⇨ Write a short note on Ashraya Ashrayi Bhava
- ⇨ Define Ashraya and Ashrayi
- ⇨ Write Dosha Dhatu Ashraya Ashrayi Bhava

MCQs

1. **Asthi Dhatu is associated with which of the following Dosha?**
   a. Vata;
   b. Pitta;
   c. Kapha;
   d. All of the above
   Answer -(a)
2. **Pitta Dosha is associated with which of the following?**
   a. Sveda;
   b. Rakta;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
3. **Which of the following Dosha and Dushya is having inverse relationship based on Ashraya and Ashrayi concept?**
   a. Vata and Asthi;
   b. Vata and Majja;
   c. Kapha and Rakta;
   d. Pitta and Shukra
   Answer -(a)
4. **Mamsa Dhatu is associated with**
   a. Vata;
   b. Pitta;
   c. Kapha;
   d. None of the above
   Answer -(c)
5. **The concept of Ashraya and Ashrayi Bhava is mentioned by**
   a. Charaka;
   b. Sushruta;
   c. Vagbhata;
   d. None of the above
   Answer -(c)

***

Dhatu Vriddhi Kshaya Lakshana

4

Learning objective of this chapter

- ⇨ Knowledge of Dosha Dhatu Vriddhi Kshaya Lakshana is helpful in assessing the stage of the illness
- ⇨ It is also helpful in deciding Dosha Dhatu involved; degree of Dosha Dhatu vitiation
- ⇨ In case of doubt regarding involved Dosha, by analysing the symptoms of the patient, we can able to predict the probable Dosha involved
- ⇨ Also helpful in deciding the Sadhyasadhyata of any illness
- ⇨ To plan the appropriate line of treatment

Introduction

- ☐ In previous sections, we have learnt that the basic constituents of the living beings are *Dosha*, *Dhatu* and *Mala*. Health will be maintained if all the constituents of the body are in appropriate proportions and the abnormal proportions of the constituents may be inferred by the presence of certain *Lakshana*.
- ☐ Symptoms of increased *Dosha* are essential in diagnosis of the disease and symptoms of decreased *Dosha* are less important as far as the diagnosis of the disease is concerned. The reason is decreased *Dosha* in the body is responsible for simultaneous increase of other *Dosha* in the body.
- ☐ 73 years old individual is presented with headache in frontal region associated with dry cough for past 3 days on exposure to cold breeze. In this instance, it is not the *Kapha Dosha* leading to the manifestation of the illness, rather increased *Vata Dosha* is accountable in the manifestation of the illness owing to the increase of *Shita Guna*.
- ☐ Where as in case of abnormal *Dhatu* and *Mala*, both symptoms of either increased or decreased *Dhatu* are essential in diagnosing the disease based on fundamentals of *Ayurveda*. Depending upon the nature, distribution, duration of *Lakshana* and associated *Lakshana*, one can assess the degree of abnormal proportion of *Dhatu* and *Mala*. For example, the presence of *Praseka* (excessive salivation) suggestive of localised increase of *Rasa* whereas *Karshya* is indicative of generalised decrease of *Rasa Dhatu*.

Utility of the present chapter

Line of treatment in case of increase of Dhatu in the body:

पूर्वः पूर्वोऽतिवृद्धत्वाद्वर्धयेद्धि परं परम्।
तस्मादतिप्रवृद्धानां धातूनां ह्रासनं हितम्।। Su.Su. – 15/22

Increase of any constituent of the body leads to the increase of similar increase in quantity showing the clinical features of the same. Hence, an increase in any body constituent should be checked and reduced to normalcy so that health can be maintained.

तेषां यथास्वं संशोधनं क्षपणं च क्षयादविरुद्धैः क्रियाविशेषैः कुर्वीत।। Su.Su. – 15/21

The abnormal increase of any one body constituent either *Dosha*, *Dhatu* or *Mala* should be checked and managed by either giving *Samshodhana* (purification) therapy or *Samshamana* (pacifying) therapy and reduction of the body constituent should not be reduced to such an extent that they show clinical features. For example, if increase of *Rasa Dhatu* is observed in the body, then line of treatment should be to pacify the increased *Rasa Dhatu* or *Kapha Dosha* such as *Vamana* (emesis) or medications having *Tejoguna* dominance can be administered.

Line of treatment in case of decrease of Dhatu in the body

तत्रापि स्वयोनिवर्धनद्रव्योपयोगः।। Su.Su. – 15/14

If decrease of body constituent is observed in the body, then measures should be taken to increase in the body constituent in the body. For example, if decrease of *Rakta Dhatu* is observed, then medications having *Tejoguna* dominance should be used to increase *Rakta Dhatu*.

दोषादीनां त्वसमतामनुमानेन लक्षयेत्।।
अप्रसन्नेन्द्रियं वीक्ष्य पुरुषं कुशलो भिषक्।। Su.Su. – 15/45

An expert clinician should identify the abnormalcy or disequilibrium of *Dosha, Dhatu* or *Mala* by inference on observing abnormal functioning of *Indriya* (sense organs and organs of action and *Manas*).

In this chapter, we are going to know the different informations related to abnormal proportions of *Dhatu* and *Malas*.

Rasa Dhatu Vriddhi and Kshaya Lakshana

रसोऽपि श्लेष्मवत् A.Hr.Su. – 11/8

श्लेष्माऽग्निसदनप्रसेकालस्यगौरवम्।।7।।
श्वैत्यशैत्यश्लथाङ्गत्वं श्वासकासातिनिद्रताः।।
A.Hr.Su. – 11/7-8

रसोऽतिवृद्धो हृदयोत्क्लेदं प्रसेकं च आपादयति।।
S.Su. – 15/8

प्रसेकारोचकास्यवैरस्यहृल्लासस्त्रोतोरोधस्वादुद्वेषाङ्ग-
मर्दादिभिरन्यैश्च श्लेष्मविकारप्रायैः रसः। A.S.Su. – 19/4

Vriddhi Lakshana of Rasa Dhatu are similar to Kapha Vriddhi Lakshana.

- ⇨ *Agnisadana* (reduced function of the digestive fire),[1]
- ⇨ *Praseka* (excessive salivation),[2]
- ⇨ *Alasya* (laziness),[3]
- ⇨ *Gourava* (heaviness of the part of the body or whole body)[4],
- ⇨ *Shvaitya* (whitish discolouration),
- ⇨ *Shaitya* (cold sensation),[5]
- ⇨ *Shlathangatva* (poor compactness of body parts),[6]

GK

[1] This can be attributable to the activation of parasympathetic nervous system which further activates gastric glands to secrete more gastric secretions diluting hydrochloric acid in the stomach thereby hampering the function of digestion in stomach

[2] This can be attributable to the stimulation of parasympathetic nervous system where in activation of parotid and submandibular glands occurs leading to the excess secretion of saliva. For further information, refer the description available in the context of *Kapha Vriddhi Lakshana.*

[3] This can be attributable to the activation of parasympathetic nervous system. Because of this, there will be increased secretions in salivary, lachrymal, gastrointestinal secretions etc. Due to the presenting complaint of heaviness of the body parts, the person might complain of laziness. The reason for heaviness of the body is explained below.

[4] The image shows the distribution of blood in the different parts of the circulatory system. 64% of the total blood volume will be present in venous system. That means when there is activation of parasympathetic nervous stimulation, there will be slower heart rate, this means lesser blood return to the right

[5] When the individual is exposed to cold atmosphere, sympathetic nervous system will become active. When the sympathetic nerves are in action, they have powerful sympathetic vaso constrictor effect in kidneys, intestine, spleen and skin, but vasoconstrictor effect is less potent in skeletal muscles and brain. That is the reason, when there is peripheral vasoconstriction, the person is likely to get cold sensation.

[6] This can be attributable to the reduction in osmotic pressure in intravascular compartment which further leads to the outward movement of fluid from capillaries to interstitial space leading to the reduced compactness of tissues of affected body parts.

- ⇨ ***Svasa*** (breathing discomfort),[7]
- ⇨ ***Kasa*** (productive cough)
- ⇨ ***Atinidrata*** (excessive sleep)[8]

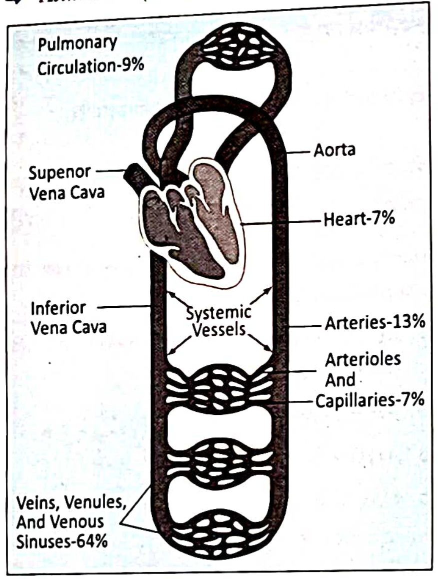

Fig 4.1: showing the distribution of blood among the different blood vessels in percentage

- ⇨ According to *Susruta*, *Hridayotkleda* or *Hrillasa* (nausea)[9] and some others say vomiting.
- ⇨ As per *Vriddha Vagbhata*, *Praseka*,
- ⇨ ***Arochaka*** (tastelessness),[10]
- ⇨ ***Asyavairasya*** (abnormal taste perception),
- ⇨ ***Hrillasa*** (nausea),
- ⇨ ***Srotorodha*** (obstruction in different Srotas),[11]
- ⇨ ***Svadudvesha*** (aversion towards sweet substances),
- ⇨ ***Angamarda*** (pain in different parts of the body)

Kshaya Lakshana of Rasa Dhatu are

रसे रौक्ष्यं श्रमः शोषो ग्लानिः शब्दासहिष्णुता।

A.Hr.Su. – 11/17

रसक्षये हृत्पीडाकम्पशोषशून्यतास्तृष्णाच। Su.Su. – 15/13

शब्दासहत्वहृदयद्रवकम्पशोषशूलशून्यतास्प-
न्दनघट्टनैरल्पयापि च चेष्टया श्रमतर्षाभ्यां रसः॥

A.S.Su. – 19/6

- ⇨ ***Roukshya*** (dryness[12] of part of the body or whole body),
- ⇨ ***Srama*** (sensation of fatigue after performing the exercise[13] or strenuous work),

- ⇨ ***Shosha*** (the state of the body where depletion of body tissues is observed generally)[14]
- ⇨ ***Glani*** (exhaustion,[15] fatigue or debility of the body),
- ⇨ ***Shabda Asahishnuta*** (intolerance to hear loud sounds or irritability to the sounds)[16].
- ⇨ As per *Susruta*, *Hrid Pida* (pain or discomfort in the *Hridaya* region)[17],
- ⇨ ***Hritkampa*** (palpitations),
- ⇨ ***Shunyata*** (emptiness of different viscera such as *Amashaya* etc)[18],
- ⇨ ***Trishna*** (thirst)[19].
- ⇨ ***Ashtanga Sangraha*** says *Shabda Asahishnutva*,
- ⇨ ***Hriddrava*** (palpitation),[20]
- ⇨ ***Hritkampa*** (palpitations),
- ⇨ ***Shula*** (pricking type of pain),
- ⇨ ***Shunyata*** (emptiness of different organs),
- ⇨ ***Aspandana*** (absence of pulsations),[21]
- ⇨ ***Ghattana*** (friction between joints)[22]

GK

7 For the explanation of *Shvasa*, *Kasa* and *Atinidrata*, refer the descriptions of *Kapha Vriddhi Lakshana*

8 The explanation is given in the context of *Kapha Vriddhi Lakshana*.

9 This mechanism occurs when there is irritation or overdistension of alimentary canal. This is responsible for the initiation of antiperistalsis which occurs several minutes prior to vomiting.
Antiperistalsis is the movement opposite to the peristaltic movement. This may start to appear from alimentary canal as low as ileum.
This movement occurs at a speed of 2-3 cm/ second. This may later responsible for the act of vomiting.

10 This presenting symptom usually associated with disturbances in the functions of the nose either in the form of nasal discharge or nasal blockage.
This can be attributable to the disturbed function of *Pranavata* and thus, we may expect the involvement of *Rasa Dhatu* in this clinical presentation.

11 This clinical mechanism will show varied clinical presentation depending upon the site of the lesion such as thrombus, pathological mechanism happening inside the body such as increased viscosity of the blood.

12 Water is considered to be the principal component of the cell. 70 – 85% of the water is present in most of the cells except fat cells which contain only upto 5% of the water. Any situation which diminishes the proportion of water such as conditions of dehydration such as vomiting or diarrhoea, fever, reduced water intake etc may lead to the depletion of the intracellular fluid compartment which compensates the depleted intravascular compartment. Thus, there will be dryness of the body seen.

13 Any local irritating factor or metabolic abnormality of muscle such as severe cold, lack of blood flow or over exercise can elicit pain or other signals transmitted from muscle to spinal cord, in turn leads to reflex feedback muscle contraction. This contraction stimulates the same receptors even more intensely, which leads to stimulation of spinal cord to increase the muscle contraction. Thus, the initial small irritation causes more and more contraction, until the muscle cramp develops

GK

14 When a muscle remains unused for many weeks, the rate of decay of the contractile proteins is more rapid than the rate of replacement. Therefore muscle atrophy occurs.
When the nerve supply to a muscle is diminished, atrophy of the muscle starts immediately. After 2 months, degenerative changes in the muscles occurs. When the nerve supply is replenished, then complete normal functioning of the muscles occurs in 3 months. But after 1-2 years of nerve damage, chances of recovery of muscles is highly remote.

15 This can be attributable to the nutrient loss occurs in the tissues due to sequential deficiency of carbohydrates, fats and proteins.

16 This clinical presentation usually observed when the person is having hypovolemia. This mechanism is leading to the shift of the fluid in the periphery to the core of the body. Thus, there will be diminishing of the fluid in the inner ear containing the perilymph and endolymph. Thus, the person may be presented with intolerance to the sound perception.

17 Commonest cause of chest discomfort due to cardiac cause is due to coronary arteriosclerosis. When the individual is performing moderate to severe exercise, the heart goes into a state of tachycardia, leading to the hampered blood supply and thereby he will be presented with pain in the retrosternal region. This is attributable to reduced blood supply to myocardial muscles.

18 Let us take the example of stomach, when the person is diagnosed to be suffering from chronic gastritis, the gastric mucosa gradually becomes more atrophic. At further stages, there will be no gastric secretions resulting in a stage of achlorhydria. The person in later stages, may develop pernicious anemia.

19 The presence of thirst indicates the degree of cellular dehydration. This mechanism can occur either due to diminished fluid intake or excessive fluid loss from the body or due to consumption of salt.

20 The term palpitation refers to the awareness of one's own heart beat, the patient may describe bumping, throbbing or pounding or fluttering. Any condition responsible for increased force, increased rate and irregularity of the heart beat usually presented with palpitation.
Conditions such as hyperthyroidism, anxiety state, organic heart disease, anemia and hypovolemia are presented with palpitation.

21 Absence of peripheral pulsations are attributable to
1. Abnormally placed artery
2. Abnormal aortic arch due to congenital malformation, acquired disease such as aneurysm, intravascular coagulation mechanism
3. Obstruction at peripheral artery – such as atheroma, thrombus, embolism.
4. Hypovolemia

In the present situation, absence of peripheral pulsations is related to hypovolemia

22 Refer the *Kapha Kshaya Lakshana* for understanding this phenomenon.

- ⇨ Exertion or exhaustion noted even after mild activities[23].

Rakta Dhatu Vriddhi and Kshaya Lakshana

रक्तं विसर्पप्लीहविद्रधीन्॥8॥
कुष्ठवातास्त्रपित्तास्त्रगुल्मोपकुशकामलाः।
व्यङ्गाग्निनाशसम्मोहरक्तत्वङ्नेत्रमूत्रताः॥ A.Hr.Su. – 11/8-9

न्क्तं रक्ताक्षग्रक्षितां सिरापूर्णत्वं च॥ Su.Su. – 15/18

कुष्ठ्ङ्गविस्सर्पपिटकासृग्दराक्षिमुखमेढ्रगुददाहगुल्मविद्र-
धिप्लीहव्यङ्गकामलाग्निनाशतमः प्रवेशरक्ताङ्ग-
नेत्रतावातरक्तपित्तादिभिरन्यैश्च पित्तविकारप्रयैरसृक्।
गलगण्ड A.S.Su. – 19/4

- ⇨ *Visarpa* (a disease of *Tvak* where in fast spreading nature of skin lesion is observed)[24],
- ⇨ *Pliha* (disease of spleen)[25],
- ⇨ *Vidradhi* (disease in which pus accumulation[26] is present inside or outside the body),
- ⇨ *Kushtha* (any skin disease)[27]
- ⇨ *Vatarakta* (disease where *Vata* and *Rakta* involvement[28] is seen such as varicose veins etc)
- ⇨ *Raktapitta* (bleeding disorders)[29],
- ⇨ *Gulma* (swelling observed in abdominal region)[30],
- ⇨ *Upakusha* (a disease involving gums)[31],
- ⇨ *Kamala* (jaundice)[32],
- ⇨ *Vyanga* (a type of *Ksudraroga* observed in face),
- ⇨ *Agninasha* (loss of digestive function),

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23 This can be attributable to the hypovolemia where in there will be shift of blood from periphery to core circulation. This will be responsible for muscle fatigue in mild form of physical activity.

24 This is a spectrum of the diseases where increased blood circulation in the skin is observed. This is identified by increased redness of the skin. This is indicative of increased of *Rakta* locally.

25 *Pliha* (spleen) is considered as *Srotomula* of *Raktavaha Srotas*. Thus, any disturbance in *Pliha* we can predict the increase of *Rakta* in the body.
As far as the functions of spleen are concerned, it acts as reservoir of blood which may accumulate upto 100 ml of the blood in case of emergency. Another major function of the spleen is blood cleansing function of the spleen where in senescent RBCs are destroyed in the spleen itself. In case of splenic dysfunction, these functions will be at fault.

26 The accumulation of pus in the body is suggestive of increase of blood supply associated with antigen antibody reaction in the affected area. This occurs when neutrophils and macrophages engulf large number of bacteria and necrotic tissue. This is responsible for the formation of cavity after several days resulting in the formation of pus. Pus is a mixture of varying portions of necrotic tissue, dead neutrophils, dead macrophages and tissue fluid.
Thus, it indirectly indicates the increase of *Rakta Dhatu* in the body.

27 It is a known fact for *Ayurveda* learner that *Kushtha* is a chronic disease involving all *Tridosha* and affliction of *Tvak, Rakta, Mamsa* and *Ambu*.

28 This is a spectrum of the diseases where we are seeing the involvement of *Vata* vitiation and increase of *Rakta Dhatu* in the body.

29 *Raktapitta* is a spectrum of diseases where one can see bleeding either through natural orifices or skin. In this condition, we can suspect the increase of *Rakta* in the affected part/ parts of the body.

30 *Gulma* is a spectrum of disease where in chronic swelling observed in the abdominal region.

31 *Upakusha* is a spectrum of disease where in excess bleeding from the gums association of formation of pus around gums is observed. This is considered to be due to the increase of *Pitta* and *Raktva* involvement

32 The term jaundice refers to excess destruction of RBCs which is leading to the formation of bilirubin and biliverdin in the body. This may occur either due to any destruction of RBC or due to hepatic dysfunction or due to obstruction to biliary outflow from gall bladder to the second part of the duodenum. This indicates the increase of *Malarupi Pitta*. Based on the context of *Ashraya Ashrayi Bhava*, increase of *Pitta* indirectly indicates increase of *Rakta* in the body.

- ⇨ *Sammoha* (altered state of consciousness)[33],
- ⇨ *Raktatvak* (reddish discolouration of skin),
- ⇨ *Raktanetra* (reddish discolouration of the eyes)
- ⇨ *Raktamutrata* (reddish urine)[34]

According to Susruta,

- ⇨ *Raktangata* (reddish body parts),
- ⇨ *Raktakshita* (reddish eyes) and
- ⇨ *Sirapurnatva* (fullness of veins)

As per Vriddha Vagbhata,

- ⇨ *Kushtha* (any skin disease)
- ⇨ *Visarpa* (affliction of skin where in there will be rapid spreading)
- ⇨ *Pidaka* (small boil)
- ⇨ *Asrik dara* (excess menstruation)
- ⇨ *Akshidaha* (burning sensation of eyes)
- ⇨ *Medhradaha* (burning sensation of the penis)
- ⇨ *Gudadaha* (burning sensation of the anus)
- ⇨ *Mukhadaha* (burning sensation of the mouth)
- ⇨ *Gulma* (swelling in the abdominal region)
- ⇨ *Vidradhi* (a disease where collection of pus is present)
- ⇨ *Pliha* (disease of spleen)
- ⇨ *Vyanga* (a type of *Kshudraroga* involving face or deformity of limb)
- ⇨ *Kamala* (jaundice),
- ⇨ *Agninasha* (loss of digestive function),
- ⇨ *Tama Pravesha* (darkness in front of eyes),
- ⇨ *Raktangata* (reddish discolouration of body parts),
- ⇨ *Raktanetrata* (reddish discolouration of eyes),
- ⇨ *Vatarakta* and
- ⇨ *Raktapitta*
- ⇨ Other *Pitta* dominant diseases

Kshaya Lakshana of Rakta Dhatu

रक्तेऽम्लशिशिरप्रीतिशिराशैथिल्यरूक्षताः॥17॥
A.Hr.Su. – 11/17

शोणितक्षये त्वक्पारुष्यमम्लशीतप्रार्थना सिराशथिल्यं च।
Su.Su. – 15/13

त्वग्रौक्ष्याम्लशीताभिलाषसिराशैथिल्यैरसृक्॥
A.S.Su. – 19/6

- ⇨ *Amla preeti* (liking towards the sour substances)
- ⇨ *Shishirapreeti* (affinity towards cold substances or cold atmosphere)
- ⇨ *Sirashaithilya* (flaccidity of blood vessels)
- ⇨ *Rukshata* (dryness of the body parts or whole body).
- ⇨ As per *Susruta, Tvak Parushya* (roughness of the skin)
- ⇨ *Amla Prarthana* (affinity towards the consumption of sour substances)[35]
- ⇨ *Shita Prarthana* (affinity towards cold substances or cold places)

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33 Transient loss of consciousness resulting from inadequate cerebral blood flow. This is clinically characterised by collapse of the patient, paleness of the patient and reactive hyperemia leading to extensive flushing. This indicates the increase of *Rakta* in the periphery

34 Increased blood circulation to the skin, eyes and urine formation indicates the increase of *Rakta* locally. It is a state of hyperemia.

35 Liking towards sour substances is attributable to the increase of *Vata* due to *Raktakshaya* and *Amla Rasa* is having opposite quality of *Vata Dosha* and thereby due to the increase of *Vata Dosha*, the person will be having liking towards *Amla Rasa* to mitigate abnormally increased *Vata Dosha*.
Liking the consumption of cold substances is attributable to the decrease of *Drava* quality of *Rakta Dhatu*, which results in the increase of *Teja* quality of *Rakta*.

- ***Sirashaithilya*** (flaccidity of blood vessels)[36]

As per Ashtanga Sangraha

- ***Tvak Roukshya*** (dryness of the skin),
- ***Amla Abhilasha*** (liking towards sour substances),
- ***Sita Abhilasha*** (liking towards cold substances or cold environment)
- ***Sira shaithilya*** (flaccidity of blood vessels).

Mamsa Vriddhi and Kshaya Lakshana

Mamsa Vriddhi Lakshana:

मासं गण्डार्बुदग्रन्थिगण्डोरूदरवृंद्धिताः।
कण्ठादिष्वधिमांसं च A.Hr.Su. – 11/10
मांसं स्फिग्गण्डौष्ठोपस्थोरुबाहुजङ्घासु वृद्धिं गुरुगात्रतां च।
Su.Su. – 15/18

गलगण्ड गण्डमालार्बुदग्रन्थितालुजिह्वाकण्ठरोग-
स्फिगलौष्ठबाहूदरोरुजङ्घागौरववृद्धिभिः।
श्लेष्मरक्तविकारप्रायैश्च मांसम्॥ A.S.Su. – 19/4

- ***Ganda*** (swelling around neck),
- ***Arbuda*** (neoplasms),
- ***Granthi*** (swelling or hardening of blood vessels),
- ***Gandavriddhita*** (enlargement of the temporal region),
- ***Uruvriddhata*** (enlargement of the thigh region),
- ***Udaravriddhata*** (enlargement of the abdominal region),
- ***Adhimamsa*** in *Kantha* (excess muscular growth of the throat) etc regions.
- According to *Susruta*, increase in the regions like *Sphik*, *Ganda*, *Oshtha*, *Upastha*, *Uru*, *Bahu* and *Jangha* (excess muscular growth of the buttocks, temple, lips, genitals, thigh, upper limb and calf regions)
- ***Gurugatratva*** (heaviness of the body parts)
- As per *Vagbhata*, *Galaganda* (anterior swelling in the neck region),
- ***Gandamala*** (group of swellings in the neck),
- ***Arbuda*** (neoplasms),
- ***Granthi*** (swelling and hardness of blood vessels),
- ***Taluroga*** (diseases of the palate),
- *Jihvaroga* (diseases of tongue),
- *Kantharoga* (diseases of the throat),
- *Sphikruja* (discomfort in buttock)
- *Galaruja* (pain in throat)
- *Oshtharuja* (pain in lips)
- *Bahuruja* (pain in upper limbs)
- *Udararuja* (pain in abdomen)
- *Angagourava* (heaviness of the body parts)

Mamsa Kshaya Lakshana

मांसेऽक्षग्लानिगण्डस्फिक्शुष्कतासन्धिवेदनाः।
A.Hr.Su. – 11/18

मांसक्षये स्फिग्गण्डौष्ठोपस्थोरुवक्षः कक्षापिण्डिकोदर-
ग्रीवाशुष्कता रौक्ष्यतोदौ गात्राणां सदनं धमनीशैथिल्यं च।
Su.Su. – 15/13

स्फिग्गण्डादिशुष्कतातोदरौक्ष्याक्षग्लानिसन्धिस्फोटनधम
नीशोथिल्यैर्मांसम्॥ A.S.Su. – 19/6

- *Akshaglani* (fatigue or exhaustion of *Indriya– Jnanendriya* and *Karmendriya*),
- *Shushkata* in *Ganda* and *Sphik pradesha* (dryness or atrophy of the cheek and buttocks) and
- *Sandhivedana* (pain in the joints).
- As per *Susruta*, *Sphik Shushkata*, (dryness of buttocks)
- *Ganda Shushkata* (dryness of cheek)
- *Oshtha Shushkata* (dryness of lips)
- *Upastha Shushkata* (dryness of genitals)
- *Uru Shushkata* (dryness of thighs)
- *Vaksha Shushkata* (dryness of chest)
- *Kaksha Shushkata* (dryness of axilla)

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[36] *Chakra* Flaccidity of the blood vessels is attributable to the lack of the *Puraka Rakta* or *Poshaka Rakta*

- *Pindika Shushkata* (dryness of calf region)
- *Udara Shushkata* (dryness of abdomen)
- *Greeva Shushkata* (dryness of nape of the neck),
- *Roukshya* (dryness of the whole body or part of the body)[37],
- As per *Ashtanga Sangraha*, *Toda* (pricking type of pain),
- *Gatra Sadana* (reduced function of the body parts) and
- *Dhamani Shaithilya* (weak pulsations in arteries).
- *Shushkata* in *Sphik* and *Ganda* (dryness of the buttocks and cheek)
- *Toda* (pricking type of pain all over the body)
- *Roukshya* (dryness of the body parts)
- *Aksha Glani* (poor functioning of the *Indriya – Jnanendriya* and *Karmendriya*)
- *Sandhi Sphotana* (cracking sounds around joints) and
- *Dhamani Shaithilya* (weak pulsations in arteries).

Medo Vriddhi and Kshaya Lakshana

Meda Vriddhi Lakshana

तद्वन्मेदस्तथा श्रमम्॥1 0॥
अल्पेऽपि चेष्टिते श्वासं स्फिक्स्तनोदरलम्बनम्॥
A.Hr.Su. – 11/10-11

मेदःस्निग्धाङ्गताभुदरपार्श्ववृद्धिं कासश्वासादीन् दौर्गन्ध्यं च।
Su.Su. – 15/18

प्रमेहपूर्वरूपैः स्थौल्योपद्रवैश्चान्येरपि श्लेष्मरक्त-
मांसविकारप्रायैर्मेदः। A.S.Su. – 19/4

- *Shwasa* or breathing discomfort even after mild activities[38]
- *Srama* (breathlessness with activities)[39]
- *lambana* (pendular movement) of *Sphik*, *Stana* and *Udara* regions[40] (buttocks, breast and abdomen)
- According to *Susruta*, *Snigdhangata* (unctuous body parts)[41]
- *Udara* and *Parsha Vriddhi* (excess growth of the abdomen and sides of the chest)[42]
- *Kasa* (cough)
- *Svasa* (breathing discomfort)
- *Dourgandhya* (foul smell from the body due to excess sweating)

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[37] Atrophy of all these parts are seen in case of *Mamsa Kshaya*.

[38] About 25 to 30% of the energy used each day by an average individual goes into muscular activity, and in a labourer, 60 – 70% of the energy goes in the similar fashion. In obese individual, increased physical activity leads to the increased energy expenditure more than the food intake. Even, a single episode of strenuous exercise may increase the basal energy expenditure for several hours after the physical activity. That is the reason, the person feels breathlessness on doing the mild physical activity.

[39] In obese people, increased physical activity increases the energy expenditure more than food intake resulting in weight loss. Even a single episode of strenuous exercise may increase the basal energy expenditure for several hours after the physical activity. This may be the reason for the breathing discomfort after the physical activity in obesity.

[40] This is attributable to the excess accumulation of the fat in the subcutaneous tissues especially in buttocks, breast and abdominal regions in particular.

[41] Large quantities of fat are stored in major tissues of the body, the adipose tissue, intraperitoneal cavity and liver. The other organs where as skeletal muscles, kidneys, heart and omentum. Adipose tissue contains fat cells (adipocytes) which are modified fibroblasts that store pure triglycerides in quantities as great as 80 to 95% of the entire cell volume.
The amount of adipose tissue normally accounts for 15% of the total body weight.
Fat is stored in adipocytes in subcutaneous tissues. That is the reason, the body parts of the obese person will have unctuous body parts.

[42] As we already know by above description, fat is stored in the subcutaneous tissue. Skin folds are normally observed in the abdomen and sides of the chest. That is the reason, in obesity, excess growth of the abdomen and sides of the chest are observed.

- As per *Ashtanga Sangraha Prameha Purvarupa* (prodromal symptoms of *Prameha* such as excess accumulation of wastes in eyes, teeth etc and burning sensation in the palms and soles)
- *Sthoulya Upadrava* (complications of obesity).

Meda Kshaya Lakshana

मेदसि स्वपनं कट्याः प्लीह्नो वृद्धिः कृशाङ्गता॥18॥

A.Hr.Su. – 11/18

मेदःक्षये प्लीहाभिवृद्धिः सन्धिशून्यता रौक्ष्यं मेदुरमांसप्रार्थना च।

Su.Su. – 15/13

प्लीहवृद्धिकटीस्वापसन्धिशून्य ताङ्गरौक्ष्यकार्श्य-श्रमशोषमेदुरमांसाभिलाषर्मांसक्षयो त्तैश्च मेदः॥

A.S.Su. – 19/6

- *Kati Svapana* (numbness in the waist region)[43],
- *Pliha Vriddhi* (excess growth of the spleen)[44] and
- *Krishangata* (leanness of the body)[45]
- As per *Sushruta*, *Plihabhivriddhi* (enlargement of spleen)
- *Sandhi Shunyata* (emptiness of joints)
- *Roukshyata* (dryness of the body parts)
- *Medura Mamsa Prarthana* (liking towards the meat abundant with fat contents)
- As per *Ashtanga Sangraha Pliha Vriddhi* (enlargement of the spleen)
- *Kati Svapa* (numbness of waist region)
- *Sandhi Shunyata* (emptiness of the joints)
- *Anga Roukshya* (dryness of the body parts)
- *Karshya* (emaciation),
- *Srama* (exhaustion or fatigue)
- *Sosha* (dryness of the body parts)
- *Medura Mamsa Abhilasha* (affinity towards the consumption of fatty and fleshy substances)

Asthi Vriddhi and Kshaya Lakshana

Asthi Vriddhi Lakshana

अस्थ्यध्यस्थ्यधिदन्तांश्च A.Hr.Su. – 11/11
अस्थि अध्यस्थीनि अधिदन्तांश्च। Su.Su. – 15/18
अध्यस्थिभिरधिदन्तै श्चास्थि। A.S.Su. – 19/4

- *Adhyasthi* (excess growth of bones) and
- *Adhidanta* (excess growth of the teeth)
- Above said same *Lakshana* are observed in *Asthi Vriddhi* as per *Susruta* and *Astanga Sangraha.*

Asthi Kshaya Lakshana

अस्थ्न्यस्थितोद रोदन दन्तकेशनखादिषु। A.Hr.Su. – 11/19

अस्थिक्षये अस्थिशूलं दन्तनखभङ्गो रौक्ष्यं च।

Su.Su. – 15/13

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[43] This type of clinical presentation could be seen in clinical condition called cauda equina syndrome where in multiple intervertebral disc affliction leading to the compression of spinal nerves presented with low back ache, weakness, areflexia, bladder dysfunction and saddle anaesthesia. This may result due to compression of spinal nerve due to the excess fat loss from the body.

[44] Splenomegaly due to reduced fatty content can be attributable to passive congestion occurring due to portal hypertension in condition of cirrhosis of liver. In starvation or in diabetes mellitus, large quantities of triglycerides will move into the liver from adipose tissues in the absence of main source of energy i.e. glucose. This is leading to the fatty change in the liver which is the prequel of cirrhosis of liver. Thus, splenomegaly may be the outcome of reduced fat content in the body.

[45] Fat cell (adipocyte) of adipose tissue are modified fibroblasts that store 80 – 95% pure triglycerides in the entire cell volume. Due to the exposure to cold or excess metabolic activity triglycerides in fat cells are renewed about once every 2 to 3 weeks.
When the person is having excess fat consumption, that will be stored in cheeks, subcutaneous tissue, breasts and buttocks. When the person is having depletion of fat due to less nutrition or exercise or chronic debilitating illnesses, fat mobilisation from above said parts occurs and thus the person develops emaciation of the body.

दन्तनखरोमकेशातनरोक्ष्यपारुष्यसन्धिशैथिल्यास्थितो-दास्थिबद्धमांसाभिलाषैरस्थि। A.S.Su. – 19/6

- *Asthitoda* (pricking type of pain in bones)[46]
- *Danta sadana* (falling of the teeth)
- *Kesha sadana* (hair fall)
- *Nakha Sadana* (falling of nails) etc[47].
- As per *Sushruta, Asthi Shula* (pricking type of pain in bones)
- *Danta bhanga* (brittle teeth)
- *Nakha Bhanga* (brittle nails)
- *Roukshya* (dryness)
- As per *Ashtanga Sangraha, Danta Shatana* (falling of teeth)
- *Nakha Shatana* (falling of nails)
- *Roma Shatana* (fall of the body hairs)
- *Kesha Shatana* (hair fall)
- *Roukshya* (dryness)
- *Parushya* (roughness)
- *Sandhi Shaithilya* (looseness of the joints)
- *Toda* (pricking type of pain)
- *Asthibaddha Mamsabhilasha* (liking towards the substances which have abundant nutrients for growth of bones)

Majja Vriddhi and Kshaya Lakshana

Majja Vriddhi Lakshana

मज्जा नेत्राङ्गगौरवम्॥11॥
पर्वसु स्थूलमूलानि कुर्यात्कृच्छ्राण्यरूंषि च।

A.Hr.Su. – 11/11-12

मज्जा सर्वाङ्गनेत्रगौरवम्। Su.Su. – 15/18

नेत्राङ्गरक्तगौरवैः पर्वसु च स्थूलमूलारुर्भिर्मज्जा।

A.S.Su. – 19/4

- *Netra Gourava* (heaviness of the eyes)[48]
- *Anga Gourava* (heaviness of the body parts)
- Huge swelling in *Parva* (digits)[49]; development of *Arunshika*[50] (ulcers) which are difficult to cure
- As per *Sushruta, Sarvanga Gourava* (heaviness of all body parts)
- *Netra gourava* (heaviness of the eyes)
- As per *Ashtanga Sangraha, Netra Gourava*
- *Anga Gourava* (heaviness of the body parts
- Huge swelling in digits or fingers

Majja Kshaya Lakshana

अस्थ्नां मज्जनि सोषिर्यं भ्रमस्तिमिरदर्शनम्॥19॥

A.Hr.Su. – 11/19

मज्जक्षये अल्पशुक्रता पर्वभेदोऽस्थिनिस्तोदोऽस्थिशून्यता च।

Su.Su. – 15/13

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[46] Pain arising from bone is usually continuous, aching character and slightest movement of the affected part induces excruciating pain.

[47] *Danta* is considered as a type of *Asthi* itself. *Kesha* and *Nakha* are the Mala of *Asthi Dhatu*. If one observes the decrease in *Asthi Dhatu* it may reflect in the decrease of *Kesha* and *Nakha* in the body. Concept of *Ashraya Ashrayi Bhava* is applied.

[48] As far as metabolic function of *Majja Dhatvagni* is concerned, poor functioning of *Majja Dhatvagni* is leading to excess formation of *Akshi, Vit* and *Tvak Sneha, mala* of *Majja Dhatu* (unctuous portion of eye, faecal matter and skin). This is responsible for the heaviness of eyes and body parts due to the increase of *Guru* quality in the body.

[49] It is being said in *Ayurveda* that *Asthi* and *Sandhi* (joints) are *Srotomula* of *Majjavaha Srotas*. If there is any abnormality is present in the *Majjavaha Srotas*, then we can observe clinical presentation related to bones and joints too. The clinical presentation may vary in the form of pain in the bones and joints and swelling in the joints. Based on the concept of *Ashraya Ashrayi Bhava*, we can say the increase of *Majja Dhatu* in case of joint swelling

[50] Manifestation of ulcers near the joints is always difficult to cure unless proper care is taken. The reason is mobility of the joints. Development of ulcers in the ankle joint is very difficult to cure because of the less vasculature of the part.

अस्थिशौषिर्यनिस्तोददौर्बल्यभ्रमतमोदर्शनैर्मज्जा।

A.S.Su. – 19/6

- ➪ *Asthi Soushirya* (emptiness of the bones)[51],
- ➪ *Bhrama* (giddiness),
- ➪ *Timira Darshana* (darkness in front of the eyes)
- ➪ As per *Sushruta, Alpa Shukrata* (reduced amount of semen),
- ➪ *Parva bheda* (tearing type of pain in joints)[52],
- ➪ *Asthi Nistoda* (pricking type of pain in bones)[53]
- ➪ *Asthi Shunyata* (empty bones)[54]
- ➪ As per *Ashtanga Sangraha, Asthi Soushirya* (porosity of the bones),
- ➪ *Nistoda* (pricking type of pain in bones),
- ➪ *Dourbalya* (weakness)[55],
- ➪ *Bhrama* (giddiness)[56]
- ➪ *Tamo darshana* (darkness in front of the eyes)[57]

Shukra Vriddhi and Kshaya Lakshana

Shukra Vriddhi Lakshana:

अतिस्त्रीकामतां वृद्धं शुक्र शुक्राश्मरीमपि॥1 2॥

A.Hr.Su. – 11/12

शुक्रं शुक्राश्मरीमतिप्रादुर्भावं च। Su.Su. – 15/18

अतिस्त्रीकामताशुक्राश्मरीसम्भवाभ्यां शुक्राधिक्यम्॥

A.S.Su. – 19/4

- ➪ *Ati Stri kamata* (excess sexual desire)[58],

G K

[51] Osteoporosis is the most common of all bone diseases in adults, especially in old age. It is different from osteomalacia and rickets because it results from diminished organic bone matrix rather than poor bone calcification.

In osteoporosis, osteoblastic activity is less than normal, and consequently the rate of osteoid deposition is depressed.

The main causes of osteoporosis:
1. Lack of physical stress on bones because of inactivity.
2. Malnutrition to the extent that sufficient protein matrix cannot be formed
3. Lack of vitamin C, necessary for the formation of osteoblasts
4. Postmenopausal lack of oestrogen secretion
5. Old age
6. Cushing's syndrome

[52] The pain arising from the joints and their adnexae are most often sharp, related to posture or to movement and accompanied by a feeling of stiffness. But, pain in the joints of the limbs are well localised except hip joint. In case of hip joint involvement, the pain may referred to knee joint. The pain of vertebral column in case of degenerative conditions, the pain may be referred as well as localised. Referred pain is produced by the pressure on nerve roots and segmental level of the lesion can be predicted.

[53] Pain arising from bones is usually continuous, aching and disturbing the sleep.

[54] There is a condition called aplastic anemia. In this condition, there will be lack of functioning of bone marrow. For example, if the person is exposed to gamma ray radiation from nuclear bomb blast and in the people who are exposed to excessive x ray treatment, certain industrial chemicals and even certain drugs especially used in malignancies.

[55] Weakness is the presenting complaint attributable to the sequel of osteoporosis. As we already know, osteoporosis is characterised by decrease of bone mass due to loss of glycoprotein matrix. It is usually associated with pathological fracture in femoral neck and lower end of the radius

[56] This is the symptom usually observed in the patients who are suffering from syncopal attack. The term syncope refers to the reduction in the blood supply to the brain, followed by spontaneous recovery. This condition sometimes preceded by lightheadedness, feeling of warmth, diaphoresis (sweating), giddiness and visual blurring.

[57] This presenting symptom is usually observed in the patient who is having syncopal attack, visual blurring is one of the symptoms observed which will be followed by temporary blindness.

[58] Apart from mental factors in relation to sexual desire, stimulation of anal epithelium, scrotum and perianal structures thence to the spinal cord add to the sexual sensation. Sexual sensations can also arise from urethra, urinary bladder, prostate, seminal vesicles, testes and vas deferens.

- ➪ *Shukrashmari* (spermoliths)[59] and the same *Lakshana* are told by *Ashtanga Sangraha.*
- ➪ As per *Sushruta, Ati pradurbhava* of *Shukra* (excessive ejaculation of semen)[60]
- ➪ *Shukrashmari* (spermolith)

Shukra Kshaya Lakshana:

शुक्रे चिरात् प्रसिच्येत शुक्रं शोणितमेव वा।
तोदोऽत्यर्थं वृषणयोर्मेढ्रं धूमायतीव च॥2 0॥

A.Hr.Su. – 11/20

शुक्रक्षये मेढ्रवृषणवेदना अशक्तिर्मैथुने चिराद्वा प्रसेकः, प्रसेके च अल्परक्तशुक्रदर्शनम्॥1 3॥ Su.Su. – 15/13

श्रम दौर्बल्यास्यशोषतिमिरदर्शनाङ्गमर्दपाण्डुतासदनक्ले-च्यमुष्कतोदमेढ्रधूमायनैश्चिराच्च निषेकेण सरक्तनि-षेकेण वा शुक्रम्॥ A.S.Su. – 19/6

- ➪ *Chirat Shukra Chyavana* (delayed ejaculation)[61],
- ➪ *Shonita chyavana* during ejaculation (presence of blood in semen during ejaculation)[62],
- ➪ *Vrishana toda* (pricking type of pain in testis),
- ➪ *Dhumayana* (sensation of burning sensation around the genitals)[63].
- ➪ As per *Sushruta, Medhra Vedana* (pain in penis)[64],

G K

Mild infection and inflammation of above said internal and external genital organs can cause increased sexual desire.

[59] Vas deferens is the structure, 2 in number,30 cm long, 3-5 mm in diameter,lined by pseudostratified columnar epithelium lined by stereocilia. This carrries mature sperm from epididymis to urethra by a process of peristalsis.

The term spermolith refers to the condition where concretion in the ductus deferens is observed. Concretion is nothing but discrete precipitates in ductus or vas deferens. This occurs due to inflammation of part of vas deferens where in obstruction to the passage of sperm can be seen.

[60] Semen is the secretion ejaculated into the vagina during the sexual intercourse by the male. This fluid contains sperms from vas deferens (10%), secretion from seminal vesicle (60%), fluid from prostate gland (30%) and small amounts from mucous glands, particularly from bulbourethral glands.

The bulk of the semen is from seminal vesicles and it is the secretion last to be ejaculated and serves to wash the sperm through the ejaculatory duct and urethra.

Normal colour of semen is white, opalescent and amount of semen ranges from 1.0 ml to 6.5 ml.

The pH of semen is about 7.5.

[61] Ejaculation involves three processes –
1. emission – seminal fluid is transferred to posterior urethra
2. bladder neck closure – to prevent the entry of semen to urinary bladder
3. ejaculation proper – movement of semen to the exterior through penis

Sympathetic innervation (T10-L2) will control emission and bladder neck closure and somatic innervation (S2-S4) will control contraction of bulbocavernous muscle and pelvic floor muscles

Causes of delayed ejaculation are either psychological or organic which are neither independent nor mutually exclusive and they may be present in the single patient at a time.

The person who has less frequency of sexual intercourse will have delayed ejaculation.

Psychological factors include performance anxiety or success phobia or fear of pregnancy or fear of hurting the partener etc and organic causes include infections or inflammations of genital tract.

[62] The conditions where we may see presence of blood in semen are
- ➪ Benign and malignant tumours of prostate, urinary bladder, seminal vesicle and testes
- ➪ Infection or inflammation of prostate, uninary bladder, seminal vesicle and testes
- ➪ Obstruction of ejaculatory duct
- ➪ Metastatic cancers with secondaries in reproductive system with primaries elsewhere in the body

[63] Infection or inflammation related to glans penis, urethra, urinary bladder, prostate, seminal vesicles will have clinical presentation of burning sensation in and around the genitals. On semen analysis, a large number of pus cells are observed.

[64] Mild infection or inflammation of glans penis leads to the clinical presentation as pain in penis.

- ⇨ *Vrishana Vedana* (pain in testis)[65],
- ⇨ *Maithune Ashakti* (inability to perform sexual activity or erectile dysfunction or impotence)[66],
- ⇨ *Chirat Shukra Praseka* (delayed ejaculation)
- ⇨ Presence of *Rakta* in *Shukra Pradurbhava* (presence of blood in the semen)
- ⇨ As per *Ashtanga Sangraha*, *Srama* (easy fatigue while doing any activity)[67],
- ⇨ *Dourbalya* (weakness),
- ⇨ *Asyashosha* (dryness of the buccal cavity)[68],
- ⇨ *Timira Darshana* (darkness in front of eyes),
- ⇨ *Angamarda* (pain in different parts of the body),
- ⇨ *Panduta* (yellowish white discolouration of the body),
- ⇨ *Sadana* (reduced function of the body)[69],
- ⇨ *Klaibya* (erectile dysfunction[70] or impotence),
- ⇨ *Mushka toda* (pricking type of pain in scrotum)[71],
- ⇨ *Medhra Dhumayana* (a sense of burning sensation in the penis),
- ⇨ *Chirat Shukra Nisheka* (delayed ejaculation of semen),
- ⇨ *Sarakta Nisheka* (the presence of blood in semen)

Several clinical features are explained for the *Vriddhi* and *Kshaya Lakshana* of *Dhatu* for which current relevance for the same is not described. Those clinical features were kept as they are.

The *Lakshana* of *Dhatu Vriddhi* and *Kshaya* mentioned by different authors are explained below with tabular form.

Table 4.1: Showing the Rasa Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshna	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Agnisadana (reduced appetite)		+	
Praseka (excess salivation)	+	+	+
Alasya (laziness)		+	
Gourava (heaviness of body parts)		+	
Svaithya (whitish discolouration)		+	
Shaitya (cold sensation)		+	
Shlathangatva (looseness of body parts)		+	
Svasa (breathing discomfort)		+	
Kasa (productive cough)		+	
Atinidrata (excessive sleep)		+	
Arochaka (tastelessness)			+
Asyavairasya (abnormal perception of taste)			+
Hrillasa (nausea)	+		+
Srotorodha (obstruction of channels of the body)			+
Svadu Dvesha (aversion of sweet taste)			+
Angamarda (bodyache)			+

GK

65 Infection or inflammation of testis (orchitis) leads to the clinical presentation as pain in the scrotal region in the region of afflicted testis.

66 The stages of male sexual act are as follow:
1. Presence of libido or sexual drive
2. Erection
3. Emission and ejaculation
4. Male orgasm
5. State of resolution

When the person is having the disturbance related to erection, he will have the inability to perform the sexual intercourse

67 Chronic stress, ongoing stress for extended period of time can have inhibitory effect on the production of testosterone and thereby the person may have reduced libido, erectile dysfunction too.

68 Dryness of mouth is seen in case of activation of sympathetic nervous system. When one relate the oral cavity and sexual activity, both can be clubbed together with sympathetic nervous system activity in the form of dryness of mouth and erection respectively.

69 This clinical presentation can be attributable to the lack of interest in any other activity as a sequel of failure in sexual activity. This is not due to presence of any physical disease, rather it can be considered to be due to the psychological disturbance

70 This clinical presentation can be attributable to the lack of interest in any other activity as a sequel of failure in sexual activity. This is not due to presence of any physical disease, rather it can be considered to be due to the psychological disturbance.

71 Infection or inflammation of testis, epididymis and vas deferens leads to the pain in the scrotal region.

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Table 4.2: Showing Rasa Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Roukshya (dryness of the body)		+	
Srama (exhaustion)		+	
Sosha (wasting of the body)	+	+	+
Glani (exhaustion or fatigue)		+	
Sabda Asahishnuta (inability to hear the sounds)		+	+
Hrit Pida (chest discomfort)	+		
Kampa (involuntary movements)	+		
Shunyata (emptiness of body parts)	+		+
Trishna (thirst)	+		+
Hridaya Drava (palpitation)			+
Alpacheshtaya Srama (development of fatigue with minimum activity)		+	
Aspandana (absence of pulsation)			+
Ghattana (friction of body parts)			+

Table 4.3: Showing Rakta Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Visarpa (disease of skin with fast spreading nature)		+	+
Pliha (disorder of spleen)		+	+
Vidradhi (accumulation of pus)		+	+
Kushtha (skin disease)		+	+
Vatarakta (disease afflicting joints)		+	+
Raktapitta (bleeding disorders)		+	
Gulma (swelling of abdominal region)		+	+
Upakusha (disorder of gum)		+	
Kamala (jaundice)		+	+

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Vyanga (a kind of Kshudraroga or deformity of limb)		+	+
Agninasha (loss of appetite)		+	+
Sammoha (altered state of consciousness)		+	
Raktatvak (reddish discolouration of skin)		+	
Rakta netra (reddish discolouration of the eye)	+	+	+
Rakta mutrata (reddish discolouration of urine)		+	
Rakta Anga (reddish discolouration of the body parts)	+		+
Sirapurnatva (fullness of the veins)	+		
Pidaka (appearance of boils)			+
Asrikdara (excess menstruation)			+
Akshidaha (burning sensation of the eyes)			+
Mukhadaha (burning sensation of the oral cavity)			+
Medhradaha (burning sensation of the genitals)			+
Gudadaha (burning sensation of the anal region)			+
Tama Pravesha (darkness in front of the eyes)			+

Table 4.4: Showing Rakta Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Amla Preethi (affinity towards sour substances)	+	+	+
Shishira Preethi (affinity towards cold substances and environment)	+	+	+
Sira Shaithilya (weak functioning of veins)	+	+	+
Roukshya (dryness of body parts)		+	
Tvak Parushya (roughness of skin)	+		+

Table 4.5: Showing Mamsa Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Galaganda (swelling of the thyroid gland)		+	+
Arbuda (neoplasms)		+	+
Granthi (swelling or hardness of blood vessels)		+	+
Gandamala (group of swelling around neck region)		+	+
Udara Vriddhita (enlargement of abdomen)		+	
Adhimamsa in Kantha etc (excess muscular growth around throat etc)		+	
Gurugatrata (heaviness of body parts)	+		

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Vriddhi in Sphik, Ganda, Oshtha, Upastha, Bahu, Jangha (enlargement of buttocks, temple, lips, genitals, upper limb or calf region)	+		
Gourava of Sphik, Gala, Oshtha, Bahu, Udara, Uru, Jangha (heaviness of the above said parts)			+
Talu, Jihva, Kantha roga (disorders of palate, tongue and throat)			+

Table 4.6: Showing Mamsa Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Akshaglani (poor functioning of Indriya)		+	
Ganda Shushkata (dryness of temporal region)		+	
Sphik Shushkata (dryness of buttocks)		+	
Sandhivedana (pain in the joints)		+	
Sphik, Ganda, Oshtha, Upastha, Uru, Vaksha, Kaksha, Pindika, Udara, Griva Shushkata (dryness of above said parts)	+		
Roukshya (dryness of body parts)	+		+
Toda (pricking type of pain)	+		+

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Gatra sadana (sluggish body parts)	+		
Dhamani Shaithilya (weak functioning of Dhamani)	+		+
Glani (exhaustion)			+
Sandhi sphutana (cracking sounds in the joints)			+
Sphik Gandadishu Shushkata (dryness of above said parts)			+

Table 4.7: Showing Meda Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Svasa during Alpa Cheshta (breathlessness on little exercise)		+	
Sphik lambana (pendulous movement of buttocks)		+	
Stana lambana (pendulous movement of breasts)		+	
Udara lambana (pendulous movement of abdomen)		+	
Snigdhangata (unctuousness of body parts)	+		
Udara vriddhi (enlargement of abdomen)	+		
Parshwa vriddhi (swelling around sides of the chest)	+		
Kasa (cough)	+		

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Svasa (breathlessness)	+		
Dourgandhya (foul smell from the body)	+		
Prameha purvarupa (prodromal symptoms of Prameha)			+
Sthoulya upadrava (complications of Sthaulya or obesity)			+

Table 4.8: Showing Meda Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Kati svapana (tingling or numbness of waist region)		+	+
Pliha vriddhi (enlargement of spleen)	+	+	+
Krishangata (blackish discolouration of body parts)		+	
Sandhi shunyata (emptiness of the joints)	+		+
Roukshya (dryness of the body parts)	+		+
Medura Mamsa prarthana (affinity to take the food which increase fat and muscle)	+		+
Karshya (emaciation)			+
Srama (fatigue)			+
Sosha (dryness of body parts)			+

Table 4.9: Showing Asthi Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Adhyasthi (excess growth of bones)	+	+	+
Adhidanta (excess growth of teeth)	+	+	+

Table 4.10: Asthi Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Asthi Toda (pricking type of pain in bones)		+	+
Danta sadana (falling of teeth)		+	+
Kesha sadana (scalp hair fall)		+	+
Nakha sadana (fall of nails)		+	+
Asthi shula (continuous pain in bones)	+		
Danta bhanga (brittle teeth)	+		
Nakha bhanga (brittle nails)	+		
Roukshya (dryness of body parts)	+		+
Roma shatana (falling of body hairs)			+
Parushya (roughness of skin)			+
Sandhi shaithilya (poor functioning of joints)			+
Asthibaddha Mamsabhilasha (affinity towards the consumption of meat attached to bones) +			

Table 4.11: Majja Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Netra Gourava (heaviness of eyes)	+	+	+
Anga Gourava (heaviness of body parts)	+	+	+
Deep seated Arumshika (ulcers) of Parva (joints)		+	+
Rakta Gourava (heaviness of blood)			+

Table 4.12: Majja Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Asthi Soushirya (empty bones)	+	+	+
Bhrama (giddiness)		+	+
Timira Darshana (darkness in front of the eyes)		+	+
Alpa Shukrata (less formation of semen)	+		
Asthi Nistoda (pricking type of pain in bones)	+		+
Parva Bheda (tearing type of pain in joints)	+		
Dourbalya (weakness)			+

Table 4.13: Shukra Vriddhi Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Ati Stri Kamata (excess libido)		+	+
Shukrashmari (spermolith)	+	+	+

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Ati Shukra Pradurbhava (excess production and ejaculation of semen)	+		

Table 4.14: Shukra Kshaya Lakshana as per different Ayurveda literatures

Name of Lakshana	Susruta	Ashtanga Hridaya	Ashtanga Sangraha
Chirat Shukra Chyavana (delayed ejaculation)	+	+	+
Sashonita chyavana (ejaculation of semen mixed with blood)	+	+	+
Vrishana toda (pricking type of pain in scrotal region)	+	+	+
Dhumayana (burning sensation)		+	+
Medhra vedana (pain in penis)	+		
Maithune Ashakti (impotence)	+		
Srama (exhaustion)			+
Dourbalya (weakness)			+
Asya shosha (dryness of mouth)			+
Timira Darshana (darkness in front of the eyes)			+
Angamarda (bodyache)			+
Panduta (pallor)			+
Sadana (sluggish body parts)			+
Klaibya (erectile dysfunction)			+
Mushka toda (pricking type of pain in scrotum)			+

Following are few common symptoms a person suffering from any ailment present with and probable involvement of *Dhatu* in these situations. Thus, you can make the list in recording the case format so that *Samprapti Ghataka* (factors of formation of *Samprapti*) can be easy. This type of analysis will be helpful in planning the appropriate line of treatment.

Table 4.15: Showing the relationship between clinical features commonly observed and probable Dosha afflicted

Clinical features	Abnormality of Dhatu
Itching all over the body	Rakta Vriddhi
Swelling in the neck region	Mamsa Vriddhi
Yellowish discolouration of the skin	Rakta Vriddhi
Whitish discolouration of the skin	Rasa Vriddhi
Raised body temperature	Rasa Vriddhi
Skin lesions	Rakta Vriddhi
Bleeding from nose	Rakta Vriddhi
Stoutness of the body	Meda Vriddhi
Erectile dysfunction	Shukra Kshaya
Delayed ejaculation	Shukra Kshaya
Brittle nails or teeth	Asthi Kshaya
Joint swelling	Asthi/ Majja Vriddhi
Burning sensation in the skin associated with redness	Rakta Vriddhi
Burning sensation in the mouth	Rakta Vriddhi
Pus formation in any part of the body	Rakta Vriddhi, Mamsa Vriddhi
Discolouration of the cheeks (chloasma)	Rakta Vriddhi
Malignant swelling in any part of the body	Mamsa Vriddhi
Profuse sweating from the body	Medas Vriddhi
Bony swelling	Asthi Vriddhi

Clinical application

- ☐ **39 years old male** individual is presented with pain in lower abdomen for past 3 days associated with increased frequency of loose stools for past 2 days. This implies the involvement of decrease of *Rasa* in the body. It also implies the decrease of *Purisha* in the body.
- ☐ **27 years old male** individual is presented with impotence from past 2 years, it implies the decrease of *Shukra* in the body.
- ☐ **35 years old female** patient is presented with brittle teeth and dental caries from past 2 years, then it suggests the decrease of *Asthi* in the body.
- ☐ **35 years old male** patient is presented with yellowish discolouration of the eyes, tongue and urine for past 20 days associated with raised body temperature for the past 18 days, it suggests the involvement of increase of *Rasa* and increase of *Rakta* in the body.
- ☐ **45 years old patient** is presented with pain in right knee joint since past 3 months, associated with loss of body hairs of right lower limb and blackish discolouration, past 2 months indicates the decrease of *Rakta* and *Asthi* in the body.
- ☐ **75 years old male** patient is presented with severe, progressive, pricking type, non-radiating pain in right knee joint associated with swelling in the same, implies the decrease of *Asthi* and *Majja* in the body.
- ☐ **17 years old male** patient is presented with inability to walk for the past 2 years associated with atrophy of muscles of the lower limbs indicates the decrease of *Mamsa* from the body.

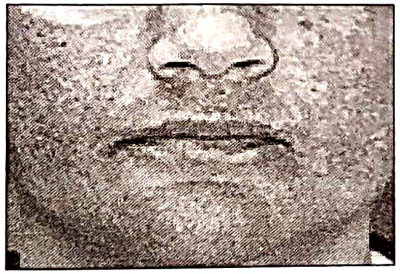


Fig 4.2: Rakta Vriddhi Few images

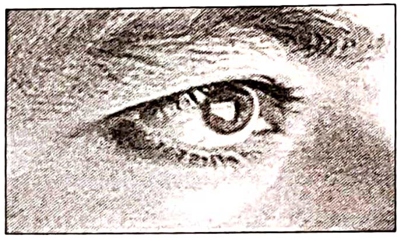


Fig 4.3: Rakta Vriddhi

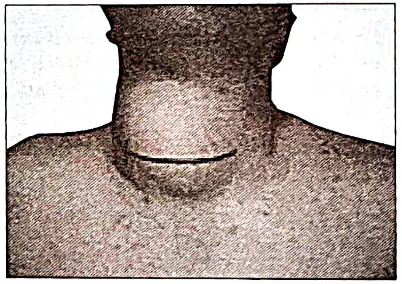


Fig 4.4: Mamsa Vriddhi

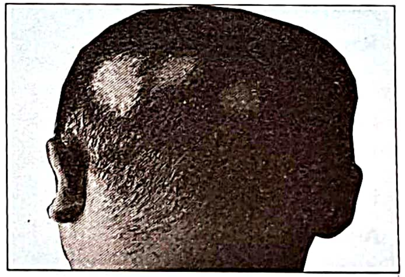


Fig 4.6: Asthi Kshaya

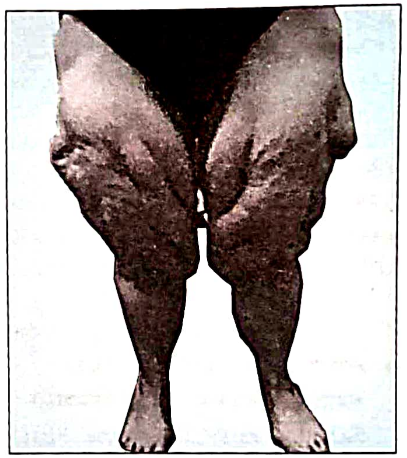


Fig 4.5: Meda Vriddhi

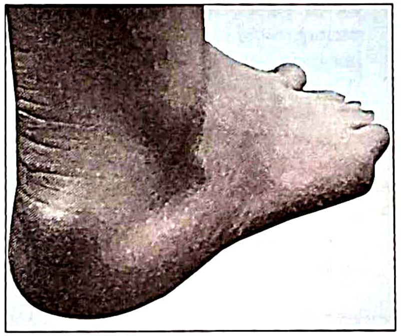


Fig 4.7: Asthi Vriddhi

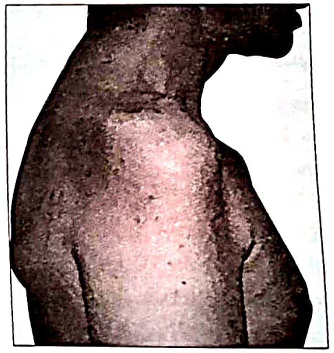


Fig 4.8: Mamsa, Medas Kshaya

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha and Ashtanga Hridaya excerpts
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders publication, 2006
3. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
4. The Merck's Manual by Robert S Porter & Justin L Kaplan, Merck Sharp & Dohme Corp, 2011
5. Best & Taylor's physiological basis of medical practice by O P Tandon & Yogesh Tripathi, Wolters-Kluwer publications, 2012

Key points of the chapter

- दोषादीनां त्वसमतामनुमानेन लक्षयेत्।।
  अप्रसन्नेन्द्रियं वीक्ष्य पुरुषं कुशलो भिषक्।।
  Su.Su. – 15/45 This verse highlights the importance of predicting the involvement of Dosha, Dhatu and Mala etc in the diseased individuals, so that management of the disease, prediction of prognosis of the disease can be analysed. When a clinician observes the decrease in Dhatu, he has to supplement the diet, drug and regimen which increases the decreased Dhatu. When a clinician observes increase in Dhatu, he has to supplement the diet, drug and regimen which leads to the decrease of increased Dhatu. This is the treatment principle that should be followed.
- The clinical features observed during the increase and decrease of different Dhatu is explained with relevant understanding incorporating information of physiology and pathophysiology.
- The clinical features mentioned in different Ayurvedic treatises is mentioned in the tabular form for better understanding.
- For a better understanding of involvement of Dhatu, few of the symptoms and probable involvement of Dhatu is mentioned.
- This is followed by few of case histories and images.

Probable questions may be asked in the examination

Long essays

- Discuss Dhatu Kshaya Vriddhi Lakshana

Short essays

- Rasa Kshaya Lakshana
- Write Vriddhi and Kshaya Lakshana of Mamsa
- Majja Kshaya and Vriddhi Lakshana
- Shukra Kshaya and Vriddhi Lakshana
- Describe Shukra Kshaya Lakshana

Short answers

- Define Dushya
- Rasa Vriddhi Lakshana
- Rasa Kshaya Lakshana
- Rakta Kshaya Lakshana
- Majja Dhatu Kshaya Lakshana
- Mamsa Dhatu Kshaya Lakshana
- Medas Kshaya Lakshana
- Asthi Vriddhi Lakshana
- Shukra Vriddhi Lakshana

MCQs

Long essays

- Discuss Dhatu Kshaya Vriddhi Lakshana

Short essays

- Rasa Kshaya Lakshana
- Write Vriddhi and Kshaya Lakshana of Mamsa
- Majja Kshaya and Vriddhi Lakshana
- Shukra Kshaya and Vriddhi Lakshana
- Describe Shukra Kshaya Lakshana

Short answers

- Define Dushya
- Rasa Vriddhi Lakshana
- Rasa Kshaya Lakshana
- Rakta Kshaya Lakshana
- Majja Dhatu Kshaya Lakshana
- Mamsa Dhatu Kshaya Lakshana
- Medas Kshaya Lakshana
- Asthi Vriddhi Lakshana
- Shukra Vriddhi Lakshana

MCQs

1. **Shabdasahishnuta (intolerance to sound) is seen in which of the following conditions?**
   a. Rasa Kshaya;
   b. Rakta Kshaya;
   c. Medas Kshaya;
   d. Shukra Kshaya
   Answer -(a)
2. **Pliha Roga is seen in which of the following conditions?**
   a. Rakta Vriddhi;
   b. Medas Vriddhi;
   c. Rasa Vriddhi;
   d. Majja Vriddhi
   Answer -(a)
3. **Arbuda is observed in which of the following situations?**
   a. Medas Vriddhi;
   b. Mamsa Vriddhi;
   c. Rakta Vriddhi;
   d. Asthi Vriddhi
   Answer -(b)
4. **Kati Svapana (numbness in the waist region) is seen in**
   a. Medas Vriddhi;
   b. Medas Kshaya;
   c. Mamsa Kshaya;
   d. Asthi Kshaya
   Answer -(b)
5. **Which of the following is the Lakshana of Medas Kshaya?**
   a. Pliha Vriddhi;
   b. Kati Svapana;
   c. Krishangata;
   d. All of the above
   Answer -(d)
6. **The percentage of sperms seen in semen during ejaculation is**
   a. 10%;
   b. 30%;
   c. 60%;
   d. 100%
   Answer -(a)
7. **The amount of adipose tissue accounts for ....% of the total body weight.**
   a. 50%;
   b. 40%;
   c. 35%;
   d. 15%
   Answer -(d)
8. **Commonest cause of chest discomfort due to cardiac cause is**
   a. Anemia;

b. Mitral stenosis;
c. Coronary atherosclerosis;
d. Aortic stenosis

Answer -(c)

9. **Udara Lambana (pendulous movement of abdomen) is seen in**
a. Medas Kshaya;
b. Medas Vriddhi;
c. Mamsa Vriddhi;
d. Majja Vriddhi

Answer -(b)

10. **Nakha Bhanga (brittle nails) is the Lakshana seen in**
a. Medas Kshaya;
b. Asthi Kshaya;
c. Majja Kshaya;
d. Mamsa Kshaya

Answer -(b)

***

Mala Vriddhi Kshaya Lakshana

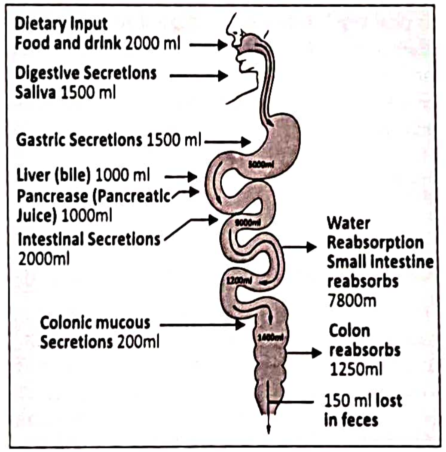
5

Learning objectives

- To know the meaning of Mala
- To know the clinical features of increased and decreased state of Mala
- To know the clinical features of Mala Pradoshaja Vikara
- To know the clinical application of above said informations

Main *Mala* are *Mutra, Purisha* and *Sveda. Mala* (residues of metabolic end products or metabolites) are those substances responsible for the deterioration of health if retained in the body. *Mala* of different *Dhatu* are explained in the introductory chapter itself. As far as functions of main *Mala* are concerned, *Mutra* and *Sveda* are related with regulation of [1]*Kleda* (fluid portion) in the body and *Purisha* is related to the function of *Avashtambha*. The term *Avashtambha*[2] refers to sustenance of the body.

Fig 5.1: Transport and balance of fluid across the alimentary canal


Dietary Input
Food and drink 2000 ml
Digestive Secretions
Saliva 1500 ml
Gastric Secretions 1500 ml
Liver (bile) 1000 ml
Pancrease (Pancreatic Juice) 1000ml
Intestinal Secretions 2000ml
9000ml
1200ml
1400ml
Water Reabsorption Small intestine reabsorbs 7800m
Colonic mucous Secretions 200ml
Colon reabsorbs 1250ml
150 ml lost in feces

Utility of the present chapter

Line of treatment in case of increase of Dhatu in the body

पूर्वः पूर्वोऽतिवृद्धत्वाद्वर्धयेद्धि परं परम्।।
तस्मादतिप्रवृद्धानां धातूनां ह्रासनं हितम्।।2 2 ।।

Su.Su. – 15/22

G K

[1] Nearly around 2,800 ml of fluid inflow occurs in the alimentary canal. 1,500 ml of fluid will move to the exterior in the form of urine, 700-800 ml of fluid will in the form of sweat, 400 ml of fluid will move in the expired air and another 100 ml of fluid will move to the external environment in the form of faecal matter.

- *Kleda vahana* (transport of fluid) in the form of urine is the normal function of *Mutra*. Extreme loss of fluid like sweat will not occur when compared to the functions of *Mutra*.
- *Kleda Vidhriti* (retention of fluid) is the main function of *Sveda* (sweat). Earlier, we have learnt normally 700-800 ml of fluid in 24 hours will move in the form of sweat. In extreme hot external environment, the amount of fluid loss increases to 2-3 litres per hour. Thus, *Sveda* regulates the huge amount of fluid in extreme environmental conditions.

[2] As far as the functions of large intestine are concerned, 20-30 gm of sodium is secreted in the alimentary canal and 5-8 gms of sodium is ingested by the individual and 25-35 gms of sodium are going to be re-absorbed in the large intestine. That is 1/7th of sodium is going to be excreted in the feces to the exterior. If the person is suffering from diarrhoea, the amount of sodium to be excreted is enhanced several folds, thus the person may go into a state of hyponatremia. Thus, normal functioning large intestine is responsible for the maintenance of health of an individual.

Increase of any constituent of the body leads to the increase of similar increase in quantity showing the clinical features of the same. Hence, an increase in any body constituent should be checked and reduced to normalcy so that health can be maintained.

तेषां यथास्वं संशोधनं क्षपणं च क्षयादविरुद्धैः।
क्रियाविशेषैः कुर्वीत॥2 1॥ Su.Su. – 15/21

The abnormal increase of any one body constituent either *Dosha, Dhatu* or Mala should be checked and managed by either giving *Samshodhana* (purification) therapy or *Samshamana* (pacifying) therapy and reduction of the body constituent should not be reduced to such an extent that they show clinical features. For example, if increase of *Rasa Dhatu* is observed in the body, then line of treatment should be to pacify the increased *Rasa Dhatu* or *Kapha Dosha* such as *Vamana* (emesis) or medications having *Tejoguna* dominance can be administered.

Line of treatment in case of decrease of Dhatu in the body

तत्रापि स्वयोनिवर्धनद्रव्योपयोगः॥1 4॥ Su.Su. – 15/14

If decrease of body constituent is observed in the body, then measures should be taken to increase in the body constituent in the body. For example, if decrease of *Rakta Dhatu* is observed, then medications having *Tejoguna* dominance should be used to increase *Rakta Dhatu*.

दोषादीनां त्वसमतामनुमानेन लक्षयेत्।
अप्रसन्नेन्द्रियं वीक्ष्य पुरुषं कुशलो भिषक्॥4 5॥
Su.Su. – 15/45

An expert clinician should identify the abnormalcy or disequilibrium of *Dosha, Dhatu* or *Mala* by inference on observing abnormal functioning of *Indriya* (sense organs and organs of action and *Manas*).

Mutra Vriddhi Kshaya Lakshana

Mutra Vriddhi Lakshana:

मूत्रं तु बस्तिनिस्तोदं कृतेऽप्यकृतसंज्ञताम्॥1 3॥
A.Hr.Su. – 11/13

मूत्रं मुहुर्मुहुः प्रवृत्तिं बस्तितोदमाध्मानं च।
Su.Su. – 15/19

बस्तितोदाध्मानैर्मूत्राधिक्यम्। A.S.Su. – 19/4

- ⇨ *Basti Nistoda* (pricking sensation in Basti or lower abdominal region)[3],
- ⇨ *Krite api Akrita Sanjnata* (persistence of urge of micturition even though the person passes urine)[4]
- ⇨ As per *Susruta, Muhu muhu pravritti* (increased frequency of micturition)[5],
- ⇨ *Adhmana* in *Basti* region (swelling in the suprapubic region[6] due to accumulation of urine in the bladder)

Mutra Kshaya Lakshana

मूत्रेऽल्पं मूत्रयेत्कृच्छ्राद्विवर्ण सास्त्रमेव वा। A.Hr.Su. – 11/22

GK

3 Cystitis is inflammation of the urinary bladder. This can happen because of two main reasons.
1. Inability of the bladder to empty completely, leaving the residual urine in the bladder
2. Existence of obstruction of urinary outflow.
⇨ As it is the infective and inflammatory condition, the person likely to get localised pain the lower abdomen, associated with increased frequency of micturition

4 Normally, after the complete voiding of the urine during micturition, usually 5 to 10 ml of urine will be left in the urinary bladder.
⇨ Due to the inflammatory changes in the bladder, the secretions from the inflamed surface will be more adding to the volume of urine, thereby leading to the increased frequency.

5 Refer the description of *Basti Nistoda* for increased frequency of micturition.

6 Normally, when the urinary filled with about 200-250 ml of urine, then the individual gets the urge of micturition. When due to any reason such as voluntary control or due to the stone present in the urethra, prostatic enlargement, bilateral ureteric calculi obstructing the passage of ureter or in case of females, cystocele, the accumulation of urine in urinary bladder exceeds > 250 ml, may reach upto 800 ml too. This is responsible for the enlargement of lower abdomen.

मूत्रक्षये बस्तितो-दोऽल्पमूत्रता च। Su.Su. – 15/15

बस्तिनिस्तोदमुखशोपकृछ्राल्पविवर्णमूत्र तादिभिः

सरुधिरमूत्रतया वा मूत्रम्। A.S.Su. – 19/6

- ⇨ *Alpa pravritti* of *Mutra* (less amount of micturition)[7],
- ⇨ *Mutrakricchra* (painful micturition)[8],
- ⇨ *Vaivarnya* (discoloured urine)[9],
- ⇨ *Raktamishrita mutra* (reddish urine)[10]
- ⇨ As per *Sushruta, Bastitoda* (pricking type of pain in Basti region)[11]
- ⇨ *Mukha Shosha* (dryness of mouth)[12]

Purisha Vriddhi and Kshaya Lakshana

Purisha Vriddhi Lakshana:

कुक्षावाध्मानमाटोपं गौरवं वेदनां शकृत्। A.Hr.Su. – 11/13
पुरीषमाटोपं कुक्षौ शूलं च। Su.Su. – 15/19
कुक्षिशूलाटोपगौरवैःशकृदाधिक्यम्। A.S.Su. – 19/4

- ⇨ *Kukshi Adhmana* (generalised abdominal swelling)[13];
- ⇨ *Atopa* (gurgling sounds in the abdominal region)[14];
- ⇨ *Gourava* (heaviness of the abdominal region)[15];
- ⇨ *Vedana* (pain in the abdominal region)[16].

GK

7 As far as the passage of urine is concerned in relation to reduced micturition, two terms are used.
1. Oliguria: When the person passes < 500 ml of urine in 24 hours
2. Anuria: When the person passes < 100 ml of urine in 24 hours.
This may be observed when the person takes very little amount of water; in situations of hypovolemia such as diarrhoea, vomiting; haemorrhage, cardiac failure and in case of renal failure

8 Painful micturition implies the presence of infection or inflammation in the urinary bladder or urethra. Infection in ureter usually presents with colicky type of pain radiating from loin to groin and infection in renal pelvis presents with increased frequency of micturition. Infection in the urethra is presented with burning micturition.

9 As far as normal colour of urine is concerned, it ranges from pale yellow to dark amber colour. Depending upon the colour of the urine, we can be in a position to make the diagnosis. For example, dark yellowish urine suggestive of the diagnosis of hepatocellular or obstructive jaundice. Pink coloured urine can be observed in the people who has the consumption of beetroots.

10 Reddish coloured urine is observed in conditions of hematuria. The conditions where we can observe hematuria are acute form of nephritis, trauma, renal infarction, malignant hypertension, congenital cystic kidney disease, neoplasm, tuberculosis etc.

11 Refer the description of *Mutrakrichra*

12 The person who presents with the complaint of polyuria develops the state of dehydration, thence the person presents with dryness of mouth.

13 Any pathology of intestines which obstruct the movement of intestinal contents such as tumours, intestinal adhesions or ulcers can lead to constipation. Further, if the person is neglecting the call of defecation, there will be gradual reduction in the strength of defecation reflexes and at last, the person may have atonia. This state is responsible for the generalised abdominal swelling due to excess accumulation of fecal matter in the rectum, sigmoid colon. Constipation can also result from spasm of small segment of the sigmoid colon.

14 Gurgling sounds are nothing but the peristaltic sounds observed during the auscultation of the abdominal region. Normal peristaltic sounds heard as clicks and gurgles occurring at a frequency of 5 to 34 per minute

15 Heaviness of the abdomen is seen when the large quantity of faecal matter gets accumulated in the rectum, sigmoid colon and descending colon. When the person suppresses the urge of defaecation, then water content from the faecal matter gets absorbed from colonic mucosa.

16 This type of pain may occur due to the spasm of the hollow large intestine. This is due to the mechanical stimulation of pain nerve endings. The spasm of the muscle of large intestine may cause diminished blood flow to the muscles of large intestine. Often, the spasm of the hollow viscus occurs in the form of muscle cramps

⇨ *Atopa* (*Gudugudayana Shabda* or increased peristaltic sounds in the *Kukshi* region)[17];

⇨ *Kukshi Shula* (pain in the abdominal region)[18]

Purisha Kshaya Lakshana

पुरीषे वायुरन्त्राणि सशब्दो वेष्टयन्निव।
कुक्षौ भ्रमति यात्यूर्ध्वे हृत्पार्श्वे पीडयन् भृशम्॥2 1 ॥

A.Hr.Su. – 11/21

पुरीषक्षये हृद्रयपार्श्वपीडा सशब्दस्य च वायोरूर्ध्वगमनं कुक्षौ संचरणं च। Su.Su. – 15/15

सशब्दस्य वायोः कुक्षौ तिर्यगूर्ध्वं च भ्रमणेनान्त्रवेष्टनेन पार्श्वहृदयपीडनेनाल्पतया च शकृत्। A.S.Su. – 19/6

⇨ *Antrani Veshtayan Iva Sashabda* (sounds in the abdominal region as if *Antra* or intestines are covered by some substance);

⇨ *Kukshou Urdhwa Bhramana* (upward movement of Vata in the abdominal region).

⇨ *Hridaya Parshwa Pida* (discomfort in the *Hridaya* or precordial region and *Parshwa* or sides of the chest region);

⇨ *Sasabda Vayoh Urdhwagamana* (upward movement of *Vata* associated with sounds);

⇨ *Kukshou Sancharana* (movement of *Vata* in the abdominal region)[19]

Sveda Vriddhi and Kshaya Lakshana

Sveda Vriddhi Lakshana

स्वेदोऽतिस्वेददौर्गन्ध्यकण्डूः। A.Hr.Su. – 11/14
स्वेदस्त्वचो दौर्गन्ध्यं कण्डूं च॥ Su.Su. – 15/19
कण्डूदौर्गन्ध्यैः स्वेदः। A.S.Su. – 19/4

⇨ *Atisveda* (excess sweating)[20];

⇨ *Dourgandhya* (foul smell due to excess sweating)[21];

⇨ *Kandu* (itching)[22].

Sveda Kshaya

स्वेदे रोमच्युतिः स्तब्धरोमता स्फुटनं त्वचः॥

A.Hr.Su. – 11/22

स्वेदक्षये स्तब्धरोमकूपता त्वक्शोषः स्पर्शवैगुण्यं स्वेदनाशश्च; Su.Su. – 15/15

स्तब्धरोमकूपतारोमच्यवनत्वक्परिपाटनस्वापपारुष्यस्वेद-

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[17] In conditions of obstruction of large intestine, on auscultation of the abdomen, peristaltic sounds are exaggerated and are loud and harsh. This is termed as borborygmi.

[18] This type of pain is visceral pain happening due to the overdistension of the large intestine. In this occasion, pain may occur either due to the overstretch of the tissues of large intestine. Overdistension can also collapse the blood vessels that encircle the viscus or pass into its wall leading to ischemic variety of pain.

[19] Absorption of 3/4th of water portion from the faecal matter present in sigmoid colon and rectum -> formation of fecolith this is leading to the state of *Purisha Kshaya* in the body in amount due to reabsorption of the fluid portion in the sigmoid colon

⇨ Absorption of gas – carbon dioxide, methane and hydrogen in particular and this will move in the large intestine

⇨ Absorption of ammonia from large intestine leading to a condition called hyperammonia (may lead to headache), liver diseases where ammonia cannot be converted into urea

[20] The amount of water lost by sweating is highly variable, depending upon the physical activity and environmental temperature. Normal loss of fluid through sweat is 100 ml/ day, but in hot weather or during heavy exercise, water loss in sweat increases upto 1 to 2 liter/ hour. This is responsible for rapid fluid loss from the body.
When the temperature of the body is increased, then there will be vasodilatation of the skin blood vessels will occur leading to profuse sweating.

[21] When compared to plasma and sweat, the ingredients of sweat are moderately increased such as urea is about 2 times that of plasma, lactic acid about 4 times than that of plasma and potassium about 1.2 times than that of plasma. There is also significant loss of sodium chloride in case of hot weather.

[22] For an unacclimatised individual, around 15-30 gms of salt will be lost per day and in an acclimatised individual after 4-6 weeks, 3-5 gms of salt will be lost. Presence of this salt may be responsible for the itching.

नाशैः स्वेदः॥ A.S.Su. – 19/6

⇨ *Romachyuti* (fall of body hairs)[23];

⇨ *Stabdharomata* (stiff body hairs)[24];

⇨ *Tvak Sphutana* (cracks in the skin)[25].

⇨ *Stabdharoomakopata* (stiffness of hair follicles)[26]

⇨ *Tvakshosha* (dryness of skin)[27],

⇨ *Sparsha Vaigunya* (abnormal touch perceptions in the form of numbness or tingling sensations)[28] and

⇨ *Svedanasha* (loss of sweating)[29]

⇨ *Tvak Svapa* (numbness of the skin)[30]

⇨ *Tavk Parushya* (roughness of the skin)[31]

Clinical application

☐ 72 years old male patient presented with the complaint of loose stools for the past 2 days associated with pain in the left hypochondriac region, this suggests the increase of *Purisha* in the body.

☐ 51 years old male patient is presented with increased frequency of micturition for past 1 year associated with nocturia and increased thirst. This suggests the increase of *Mutra* formation in the body. This is associated with *Rasa Kshaya* too.

☐ 81 years old female patient is presented with excess sweating and excess micturition from the past 2 months, may indicate the increase of *Mutra* and *Sveda* in the patient.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha and Ashtanga Hridaya excerpts
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders publication, 2006
3. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
4. The Merck's Manual by Robert S Porter & Justin L Kaplan, Merck Sharp & Dohme Corp, 2011
5. Best & Taylor's physiological basis of medical practice by O P Tandon & Yogesh Tripathi, Wolters-Kluwer publications, 2012

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[23] This is attributable to the skin vasoconstriction throughout the body. This is responsible for shininess of the skin. This is especially seen in arterial insufficiency.

[24] This condition especially happens when the body is too cold, the following mechanisms happen.
1. Skin vasoconstriction throughout the body
2. Pilo erection: This means hairs standing on the end. Sympathetic stimulation causes arrector pili muscles to the hair follicles to contracts, which brings the hairs to an upright stance.

[25] Cracks in the skin are attributable to the skin vasoconstriction throughout the body.

[26] This can be attributable to Pilo erection: This means hairs standing on the end.

[27] Refer the description of Tvak Sphutana

[28] All skin receptors are embedded in the skin or subcutaneous tissues. Responses depend on the physical characters of the receptors and on the nature of exposure to etiological factor. In case of reduced sweating, there will be peripheral vaso constriction, thereby nutrition to these sensory receptors will be deprived, thereby the person may present with abnormal touch perceptions

[29] Absence of sweating refers to the vasoconstriction of skin throughout the body. Even this may be attributable to the cold environment too.

[30] Refer Sparsha Vaigunya

[31] Refer Tvak Sphutana

Key points of the chapter

- ⇨ Mala (residues of metabolic end products or metabolites) are those substances responsible for the deterioration of health if retained in the body. Main Mala are Mutra, Purisha and Sveda.
- ⇨ Physiological aspects of faeces, urine and sweat is elaborated. Nearly around 2,800 ml of fluid inflow is seen in alimentary canal. 1,500 ml of fluid will move in the form of urine, 700-800 ml of fluid will move out in the form of sweat, 400 ml of fluid will move out in the form of expired air and 100 ml of fluid will move to exterior in the form of faeces.
- ⇨ Vriddhi and Kshaya Lakshana of Mutra, Purisha and Sveda as per different Ayurveda literatures is discussed elaborately in this section along with current understanding. The clinical significance of this knowledge is to supplement the deficient form and eliminating the excess from the body to the exterior.

Probable questions may be asked in the examination

Short essays

- ⇨ Explain Purisha Vriddhi and Kshaya Lakshana
- ⇨ Explain Mutra Vriddhi and Kshaya Lakshana

Short answers

- ⇨ Write Purisha/Mutra/ Sveda Vriddhi Lakshana
- ⇨ Write Purisha/ Mutra/ Sveda Kshaya Lakshana

MCQs

1. **Avashtambha is the normal function of**
   a. Mutra;
   b. Purisha;
   c. Sveda;
   d. Shukra

   Answer -(b)

2. **The term oliguria refers to the amount of urine passed in 24 hours is less than ………..ml in 24 hours.**
   a. 100 ml;
   b. 500 ml;
   c. 1,000 ml;
   d. 2,000 ml

   Answer -(b)

3. **Normal peristaltic sounds frequency ranges from ………….. per minute.**
   a. 1 to 2;
   b. 10 to 15;
   c. 5 to 34;
   d. None of the above

   Answer -(c)

4. **Sparshavaigunya is seen in which of the following Vikrita Mala?**
   a. Purisha Kshaya;
   b. Mutra Kshaya;
   c. Sveda Kshaya;
   d. Sveda Vriddhi

   Answer -(c)

5. **The amount of urine passed in one frequency of micturition is**
   a. 100 to 150 ml;
   b. 200 to 250 ml;
   c. 300 to 350 ml;
   d. 450 to 500 ml

   Answer -(b)

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6

Hetu, Bheda And Lakshana of Agni Dushti

Learning objectives

- ⇨ Able to understand the meaning of Agni and its role in the manifestation of the disease
- ⇨ Able to understanding the importance of Agni
- ⇨ Able to understand the concept of Agni Vyapara
- ⇨ Able to understand the types of Agni
- ⇨ Able to understand the current understanding of Agni

Introduction

Agni is the principal component of the living body. It is responsible for all kinds of activities happening inside the body. The metabolic activity including anabolism and catabolism is the outcome of properly functioning Agni. The following are the benefits and ill effects of properly and improperly functioning of Agni respectively.

आयुर्वर्णो बलं स्वास्थ्यमुत्साहोपचयौ प्रभा।
ओजस्तेजोऽग्नयः प्राणाश्चोक्ता देहाग्निहेतुकाः॥3॥
शान्तेऽग्नौ म्रियते, युक्ते चिरं जीवनत्यनामयः।
रोगी स्याद्विर्वृते, मूलमग्निस्तस्मान्निरुच्यते॥4॥

Ca.Ci. – 15/3-4

Properly functioning Jatharagni[1] is responsible for the longevity, complexion, strength, health, enthusiasm, nourishment,[2] lustre, immunity, temperature and proper functioning of other *Agnis* (*Dhatvagni* and *Bhutagni*). If the functions of Agni are hampered, then that will lead to death of the person and proper functioning of Agni leads to long, healthy life.

अन्नस्य पक्ता सर्वेषां पक्तृणामधिपो मतः।
तन्मूलास्ते हि तद्वृद्धिक्षयवृद्धिक्षयात्मकाः॥39॥
तस्मात्तं विधिवद्युक्तैरन्नपानेन्धनैर्हितैः।
पालयेत् प्रयतस्तस्य स्थितौ ह्यायुर्बलस्थितिः॥40॥

Ca.Ci. – 15/39-40

Among the types of *Agni*, *Jatharagni* (digestive

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1 Digestive juice of the stomach is composed of the secretion having mucus, hydrochloric acid, pepsinogen, intrinsic factor.

- ⇨ Mucus secreted by mucous glands of the pyloric part of the stomach prevent the damage of the gastric wall from the hydrochloric acid.
- ⇨ Hydrochloric acid activates the pepsinogen into highly active pepsin in highly acidic medium (pH 1.8 to 3.5). If pH is about 5, then no metabolism of the protein takes place.
- ⇨ Pepsin is considered to be proteolytic.
- ⇨ Intrinsic factor is secreted along with hydrochloric acid and is responsible for the absorption of vitamin B12.

If the digestive juice is not adequately secreted, then pepsin activity is hampered thus leading to disturbance in protein metabolism; intrinsic factor deficiency leading to the inadequate absorption of vitamin B12, manifesting anemia. Thus, the person will develop generalised symptoms in relation to anemia and disturbed metabolism.

2 It is being said that Growth Hormone (GH) is secreted in pulsatile manner. The causes for stimulation of GH are said to be 1. Starvation (with severe protein deficiency); 2. Hypoglycemia and low fatty acids in the blood; 3. Exercise; 4. Excitement and 5. Trauma. Among these, first two causes are related to proper digestive activity)

fire of the *Amashaya*) is of paramount importance, as this *Agni* will be responsible for the proper functioning of other types of *Agni* namely, *Dhatvagni* and *Bhutagni*. If there is poor functioning of *Jatharagni*, *Dhatvagni* and *Bhutagni* will also be poor in their functions, and if there is hyperfunctioning of *Jatharagni*, the *Dhatvagni* and *Bhutagni* will also be hyperactive. If one wants the long and healthy life, one should protect and maintain the normal functioning of *Jatharagni* so that *Dhatvagni* and *Bhutagni* will be performing their appropriate functions.

Physiology of Agni[3]

अन्नमादानकर्मा तु प्राणः कोष्ठं प्रकर्षति।
तद्द्रवैर्भिन्नसंघातं स्नेहेन मृदुतां गतम्॥6॥
समानेनावधूतोऽग्निरुदर्यः पवनोद्वहः।
काले भुक्तं समं सम्यक् पचत्यायुर्विवृद्धये॥7॥

Ca.Ci. – 15/6-7

⇨ Ingestion of food through mouth

⇨ *Pranavata* moves the food from mouth to *Koshtha* i.e. *Mahasrotas* (alimentary canal)[4].

⇨ Macromolecules of food will be turned into micromolecules as well as softening of food by *Drava* (liquid) quality and *Sneha* (unctuous)[5] quality in the *Koshtha* with the support of *Samana Vata* and *Pachakagni*. The digestion of ingested food happens provided the following conditions are met.

Method of food intake as mentioned in 1st chapter of *Vimana Sthana* of *Caraka Samhita*.

तत्रेदमाहारविधिविधानमरोगाणामातुराणां चापि केषांचित् काले प्रकृत्यैव हिततमं भुञ्जानानां भवति-उष्णं, स्निग्धं, मात्रावत्, जीर्णे वीर्याविरुद्धम्, इष्टे देशे, इष्टसर्वोपकरणं, नातिद्रुतं, नातिविलम्बितम्, अजल्पन्, अहसन्, तन्मना भुञ्जीत, आत्मानमभिसमीक्ष्य सम्यक्॥24॥

Ca.Vi. – 1/24

☐ The food should be in calculated amount i.e. the amount of ingested food should be of 2/3rd of *Amashaya*.

GK

[3] All changes occurring at macroscopic, microscopic at inorganic, organic levels are due to *Pakakarmas* of Agni only. All the materials consumed by human through enteral or parenteral route are getting digested, absorbed and assimilated through the medium of Agni only.
The term Agni refers to the factors responsible for the metabolic changes occurring in the body. These kinds of changes occur in the body due to the enzymatic and hormonal reactions inside the body.

[4] *Mahasrotas* (alimentary canal) function is broadly categorised into two main headings: Agni (digestion and metabolism) and *Koshtha* (excretion).
In brief, the functions of alimentary canal are
1. Movement of food through alimentary canal
2. Secretion of digestive juices and digestion of the food
3. Absorption of water, various electrolytes and digestive products
4. Circulation of blood through the gastrointestinal organs to carry away the absorbed substances
5. Control of all these functions by local, nervous and hormonal systems

[5] Importance of mucus in alimentary canal: Mucus is a thick secretion composed of water, electrolytes and a mixture of several glycoproteins. Mucus is slightly different in different parts of alimentary canal, but everywhere it has several important characteristics that make it both an excellent lubricant and protectant for the wall of the gut.
1. Mucus has adherent qualities that make it adhere tightly to the food or other particles and spread as a thin film over the surfaces.
2. It has sufficient body that coats the wall of the gut and prevents actual contact of most food articles with mucosa of alimentary canal.
3. Mucus has low resistance for slippage, so that the particles can slide along the epithelium with ease.
4. Mucus causes faecal particles to adhere to one another to form the faeces to be expelled out during bowel movement.
5. Mucus is strongly resistant to digestion by the gastrointestinal enzymes.
6. Glycoproteins of mucus are capable of buffering small amounts of either acids or alkalies and contains moderate amount of bicarbonate ions which neutralise the acids.

☐ The ingested food should be warm or hot[6].

☐ When the person gets the appetite, he should take the food

☐ The food should have adequate property of unctuousness

☐ The food should be taken after the complete digestion of ingested food and when the person gets hunger

☐ The food should be taken with much concentration

☐ The food should be taken in a comfortable place

☐ While taking food, one should not talk with surrounding people, should not laugh[7].

☐ The person should not take food too fast, too slow

☐ If any one of the above said conditions are not met, then that will lead to impairment of Agni.

☐ For example, if the person consumes more quantity of *Lavanayukta Ahara* (food consumption having excess salt taste)[8], more than 2/3rd of *Amashaya*, that will lead to the vitiation of *Pitta* and *Kapha Dosha* in the body.

☐ If the person is having the habit of taking the cold food[9] or *Shita Virya* food substances for example, frequent consumption of curds, then that will lead to suppression of digestive fire, delayed digestion of food, will not cause the depletion of *Kapha* necessary for the digestion of food and checks the movement of *Vata* downwards. (Ca.Vi. – 1/25-1)

Ahara Parinama[10] inside the body[11]

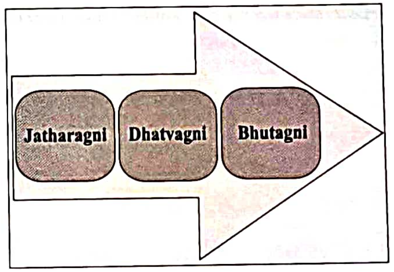

Chart 6.1: of sequential involvement of Jatharagni,

GK

[6] Warm or hot food consumption will lead to the proper blood circulation of the alimentary mucosa in the stomach. Thus, proper secretion of digestive juices takes place thus aid in the adequate digestion of food.

[7] This manoeuvre is responsible for the aspiration of the food into the respiratory passages, reverse peristaltic movement of the already ingested food, inability

[8] Excess intake of salt will lead to the absorption of sodium chloride, resulting in the excess volume of the blood. This will lead to hypertension.

[9] Consumption of cold food substances is responsible for the decreased secretion in the alimentary canal, as this is responsible for contraction of secretory cells of the alimentary canal

[10] If we analyse the functional anatomy of the alimentary canal, it is categorised into several compartments depending upon the transport of the food and the nature of the functions in these compartments.
1. Mouth to upper oesophageal sphincter – proper churning, mastication and swallowing of food, this may take several minutes
2. Upper oesophageal to lower oesophageal sphincter – transport of food from pharynx to stomach, this will occur in seconds
3. Lower oesophageal sphincter to pyloric sphincter – in this compartment, storage of food, digestion of proteins and carbohydrates and after the formation of chyme, movement of chyme to duodenum will occur. This will take upto 2 hours
4. Pyloric sphincter to ileocaecal junction – in this compartment, digestion and assimilation of food and further movement of digested food into large intestine occurs. This may take upto 6 hours
5. Ileocaecal junction to sigmoid colon junction – in this compartment, out of around 1500 ml of chyme, nearly around 1400 ml of fluid portion is absorbed from large intestinal mucosa and rest of the fluid is going to be excreted from anal canal. This may take 1 – 2 days.

[11] According to some, the sequence of Agni in the body is as follows: *Jatharagni* * *Bhutagni* * *Dhatvagni* * *Bhutagni*. Below diagrams need more description

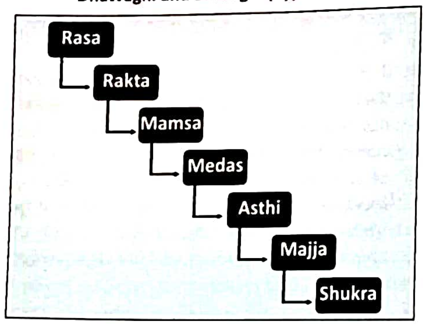
Dhatvagni and Bhutagni (hypothesis)

Chart 6.2: showing the sequenfial formation of Dhatu

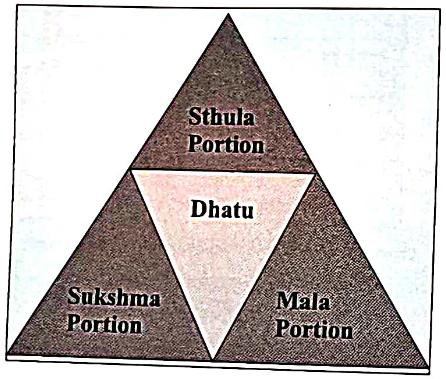

Chart 6.3: showing the composition of individual Dhatu

Each *Dhatu* is having three portions namely, *Sthula* portion, *Sukshma* portion and *Mala* portion. In this each *Sthula* portion nourishes the same *Dhatu*, *Sukshma* portion nourishes the subsequent *Dhatu* and *Mala* portion is formed due to the *Dhatvagni* acting on that particular *Dhatu* after formation of *Sara Bhaga* from that particular *Dhatu*. For example, *Sthula* portion of *Rasa Dhatu* nourishes *Rasa Dhatu*, *Sukshma* portion nourishes *Rakta Dhatu* and *Mala* of *Rasa Dhatu* is *Kapha* formed during *Rasa Dhatvagni* action on *Ahara Rasa*. In the same way, we have to consider for other *Dhatu* too.

प्रागभिहितोऽग्निरन्नस्य पाचकः।
स चतुर्विधो भवति-दोषानभिपन्न एकः;
विक्रियामापन्नस्त्रिविधो भवति-विषमो वातेन, तीक्ष्ण;
पित्तेन, मन्दः श्लेष्मणा, चतुर्थः समः सर्वसाम्यादिति।
तत्र, यो

Su.Su. – 35/24

अग्निषु तु शारीरेषु चतुर्विधो विशेषो बलभेदेन भवति।
तद्यथा-तीक्ष्णो, मन्दः, समो, विषमश्चेति।
तत्र तीक्ष्णोऽग्निः सर्वापचारसहः, तद्विपरीतलक्षणस्तु मन्दः, समस्तु खल्वपचारतो विकृतिमापद्यतेऽनपचारतस्तु प्रकृतावतिष्ठते, समलक्षणविपरीतलक्षणस्तु विषम इति।
एते चतुर्विधाभवन्त्यग्नयश्चतुर्विधानामेव पुरुषाणाम्।
तत्र सम-

Ca.Vi. – 6/12

As stated earlier, *Pachakagni* is considered to be major factor responsible for the digestion and metabolism of the ingested food. Further, there are 4 types of *Agni* depending upon the dominance of *Dosha*.

1. **Samagni:** in this state of *Agni*, there is no dominance of single *Dosha*. This is physiological state of *Agni*.
2. **Vishamagni:** in this state of Agni, there is dominance of *Vata Dosha*
3. **Tikshnagni:** in this state of Agni, there is dominance of *Pitta Dosha*
4. **Mandagni:** in this state of *Agni*, there is dominance of *Kapha Dosha*.

Samagni

यथाकालमुपयुक्तन्नं सम्यक् पचति स समः, समैर्दोषैः॥

Su.Su. – 35/24

Samagni is the state of *Agni* in which all *Sharirika Dosha* are in the equilibrium and the person will have the digestion and assimilation at proper time which can be known by *Jirnahara Lakshana*.

उद् गारशुद्धिरुत्साहो वेगोत्सर्गो यथोचितः।
लघुता क्षुत्पिपासा च जीर्णाहारस्य लक्षणम्॥24॥

M.Ni. – 6/24

The *Jirnahara Lakshana* told by *Madhava Nidana* are as follow: *Udgarashuddhi* (belching devoid of abnormal taste), *Utsaha* (proper enthusiasm to do any activities), *Vegotsarga* (proper movement of natural urges), *Laghuta* (lightness of the body), *Kshut Pipasa* (developing hunger and thirst at proper time).

As per *Caraka*, he has mentioned specific features for the proper quantity of food intake.

थत्र मात्रावत्त्वं पूर्वमुद्दिष्टं कुक्ष्यंशविभागेन, तद्भयो विस्तरेणानुव्याख्यास्यामः।
तद्यथा-कुक्षेरप्रपीडनमाहारेण, हृदयस्यानवरोधः, पार्श्वयोरविपाटनम्, अनतिगौरवमुदरस्य, प्रीणनमिन्द्रियाणां, क्षुत्पिपासोपरमः, थानासनशयनगमनोच्छ्वासप्रश्वासहास्यसंकथासु सुखानुवृत्तिः, सायं प्रातश्च सुखेन परिणमनं, बलवर्णोपचयकरत्वं च; इति मात्रावतो लक्षणमाहारस्य भवति॥6॥

- ⇨ No undue pressure on abdomen due to the consumption of food
- ⇨ No chest discomfort or no obstruction to the proper functioning of heart
- ⇨ No pressure on the sides of the chest
- ⇨ No excess heaviness of the abdomen
- ⇨ Proper nourishment of *Indriya* (sense organs)
- ⇨ Relief from hunger and thirst
- ⇨ Feeling of comfort in standing, sitting, walking, exhaling, inhaling, laughing, talking
- ⇨ Food consumed in the morning will get digested by evening and food taken during evening will get digested by next morning
- ⇨ Proper strength, complexion and plumpiness will be attained.

Vishamagni

समैर्दोषैः; यः कदाचित् सम्यक् पचति, कदाचिदा-ध्मान शूलोदावर्तातिसारजठरगौरवान्त्रकूजनप्रवाहणानि कृत्वा स विषमः; यः प्रभूतमप्युपयुक्त

Su.Su. – 35/24

Vishamagni is the type of *Agni* which is *Vata* dominant. In this type of *Agni*, there will be proper digestion of ingested food sometimes and sometimes the person will be presented with the symptoms such as flatulence, pricking type of pain in the abdomen, *Udavarta* (reverse movement of *Apana Vata*), passage of semisolid to liquid stools, heaviness of abdominal region, gurgling sounds in the intestine, straining for defecation are observed.

Tikshnagni

यः प्रभूतमप्युपयुक्तमन्नमाशु पचति स तीक्ष्णः, स एवाभिवर्धमानोऽत्यग्निरिति आभाष्यते, स मुहुर्मुहुः प्रभूतमप्युपयुक्तमाशुतरं पचति पाकान्ते च गलताल्वोष्ठशोषदाहसन्तापान् जनयति;
यस्त्वल्पमप्युपयुक्तमुदर

Su.Su. 35/24

Tikshnagni is the status of *Agni* where in large quantity of ingested food will be digested in short time and the person frequently develops appetite. The person may develop dryness of throat, palate, lips burning sensation all over the body and raised body temperature of the body.

Mandagni

यस्त्वल्पमप्युपयुक्तमुदरशिरोगौरवकासश्वासप्रसेकच्छर्दिगात्रसदनानि कृत्वा महता कालेन पचति स मन्दः॥24॥

Su.Su. – 35/24

In the status of *Mandagni*, the person may take more time to have the complete digestion of food even if the quantity is small. The person may also be presented with heaviness of head, cough, breathlessness, vomiting and sluggish movements of body parts.

रोगाःसर्वेऽपि मंदेऽग्नौ सुतरामुदराणि तु॥

A.S.Ni. – 12/1

Almost all diseases are due to the hampered function of *Jatharagni*, *Udara* in particular.

Nidana of Agnidushti

अत्यम्बुपानाद्विषमाशनाच्च संधारणात्स्वप्नविपर्ययाच्च।
कालेऽपि सात्म्यं लघु चापि भुक्तमन्नं न पाकं भजते नस्य॥7॥
ईर्ष्याभयक्रोधपरिप्लुतेन लुब्धेन रुग्दैन्यनिपीडितेन।
प्रद्वेषयुक्तेन च सेव्यमानमन्नं न सम्यक्परिपाकमेति॥8॥
मात्रयाऽप्यभ्यवहृतं पथ्यं चान्नं न जीर्यति।
चिन्ताशोकभयक्रोधदुःखशय्याप्रजागरैः॥9॥

Ma.Ni. – 6/7-9

⇨ *Atyambupana* – excess consumption of water. *Ambu* (water)[12] is having a *Drava* and *Shita Guna* and this has the opposite quality of *Agni* (digestive fire). That is the reason, excess consumption will reduce the functioning of *Agni*.

⇨ *Vishamashana*[13] – consumption of food substances which are irregular in time and quantity. That means consuming the food before the digestion of previous ingested meals sometimes and at some other occasions, consuming the food substances after complete digestion of previously ingested meals, in some occasions, consuming very little amount of food and in some other occasions, consuming very large amount of food.

⇨ *Sandharana* – suppression of natural urges[14]

⇨ *Svapna Viparyaya* – sleeping at improper time[15]

⇨ Even though the person consumes adequate amount of wholesome food, if the person is having mental disturbances such as fear, jealousy, anger, discomfort, hatredness etc[16], excess thinking, sleeping during day time and awakening at night time.

अभोजनादजीर्णातिभोजनाद्विषमाशनात्।
असात्म्यगुरुशीतातिरूक्षसंदुष्टभोजनात्॥4 2॥
विरेकवमनस्नेहविभ्रह्याधिकर्षणात्।
देशकालर्तुवैषम्याद्वेगानां च विधारणात्॥4 3॥

Ca.Ci. – 15/42-44

⇨ *Abhojana* (no consumption of food or very little food consumption)[17],

⇨ *Ajirne Atibhojana* (consumption of large amount of food prior to the digestion of previous meal)[18],

⇨ *Visamasana* (consumption of untimely food

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[12] As per Textbook of pathology by Harsh Mohan, the clinical features observed due to excess consumption of water are nausea, vomiting, headache, confusion and in severe cases convulsions, coma and death. The changes observed in plasma include reduced plasma electrolytes, reduced plasma proteins and reduced PCV (Packed cell volume). This is stated as the condition of water intoxication.
In water intoxication, there will be expansion of extra cellular fluid (ECF) compartment and intracellular oedema. First there will be diuretic phase followed by oliguria or even anuria due to damaged renal tubular epithelial cells.

[13] As far as secretions of stomach are concerned, stomach secretes a few ml of gastric juice each hour in between the meals period. This is the stage where little or no digestion is occurring in anywhere in the alimentary canal.
The secretion of stomach is usually almost entirely of nonoxyntic type, composed mainly of mucus, but little pepsin and almost no HCl.
That is the reason, consuming the food at improper time may lead to impaired digestion.

[14] Let us take the example of urge of defecation. If one suppresses the natural urge of defecation, that will lead to the constriction of anal sphincter, thereby leading to the absorption of the water portion and simultaneously there will be decreased secretion from the glands of the alimentary canal. Thus, digestion impairment can be seen in the persons who neglect the natural call of defecation.

[15] In general, sleep decreases metabolic rate 10-15% below normal during sleep. This decrease is due to two major factors
1. decreased tone of skeletal muscles during sleep
2. decreased activity of central nervous system
Sleeping at improper time disturbed these two mechanisms thereby disturbing metabolism of the body.

[16] It is being said that there will be increased secretion of gastric secretion in interdigestion period upto 50 ml or more per hour. This is leading to the manifestation of gastric ulcer.

[17] It is being said that there will be increased secretion of gastric secretion in interdigestion period upto 50 ml or more per hour. This is leading to the manifestation of gastric ulcer.

[18] During interdigestion period, stomach secretes a few ml of gastric juice each hour, when little or no digestion of food is taking place. The secretion during this period, is almost mucus in nature and no acid is being secreted. Thus, the person consumes in inter digestion period, he will likely to suffer from digestive impairment.

or irregular amount of food)[19],

⇨ *Asatmya Bhojana* (consumption of unwholesome food)[20],

⇨ *Guru Bhojana* (consumption of food substances which are heavy to digest), in this the time taken for the complete digestion of food in the *Amashaya* will be more than normal. In other words, the ingested food will stay in the stomach for longer duration i.e. more than 2 hours.

⇨ *Sita Bhojana* (consumption of food substances which are either cold potency or cold to touch)[21],

⇨ *Ati Sandusta Bhojana* (consumption of food which has some materials which are hard to digest such as scalp hair etc)[22],

⇨ *Vireka Vamana Sneha Vibhrama* (improper diet and regimen followed during purificatory procedure),

⇨ *Vyadhikarsana* (emaciation of the body due to illness)[23],

⇨ *Desha Vaisamya* (abnormal characters of the residence of the individual),

⇨ *Kala Vaisamya* (variations in relation to time),

⇨ *Ritu Vaisamya* (seasonal variations),

⇨ *Vega Vidharana* (suppression of urges)[24].

Samprapti of Agni Dushti

दुष्यत्यग्निः, स दुष्टोऽन्नं न तत् पचति लघ्वपि।
अपच्यमानं शुक्तत्वं यात्यन्नं विषरूपताम्॥4 4॥

Ca.Ci. – 15/44

Because of the above said reasons, there will be *Agni Dushti* (impaired functions of *Agni*). Due to this abnormal *Agni* function, even the food substances which are having *Laghu* (the substances which will be digested quickly) quality will not be digested and metabolic end products will be produced. This undigested Anna will stay in *Amashaya* and leading to the process of fermentation (*Shuktatva* or *Amlatva*). After this process, there will be formation of *Amavisha* out of this improperly digested food in *Amashaya*.

It is a state where ingested substances undergo a process of *Paka* (digestion). In this state, the ingested food will not be completely transformed into assimilable substances due to abnormal *Ahara Parinamakara Bhava* (*Ushma, Vayu, Kleda, Sneha, Kala* and *Samayoga*). Therefore the end products of digestion will not happen in *Mahasrotas* (alimentary canal). Thus, there will be stasis of the remnants of ingested food in *Mahasrotas* and this by product of improperly digested food stayed in *Amashaya* is termed as *Ama*.

ऊष्मणोऽल्पबलत्वेन धातुमाद्यमपाचितम्।
दुष्टमामाशयगतं रसमामं प्रचक्षते॥ A.Hr.Su. – 13/25

Due to various reasons, such as excess consumption of liquids or untimely intake of irregular amount of food, there will be reduced function of *Jatharagni* (digestive fire) due to reduced quality of *Ushma* (digestive fire). This reduced activity of Agni is responsible for the production of improperly formed *Ahara Rasa*. Further, this will lead to the formation of improper *Rasa Dhatu*. Thus, improperly formed *Ahara Rasa* is the kind of food residue which is neither fit for further transformation nor absorption/ assimilation. That is why, this type of food residue is termed as *Dushta* which stays in *Amashaya* and this will be associated with *Dosha, Dhatu, Mala* etc and responsible for the manifestation of multiple diseases. This is called as *Ama*.

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[19] Refer the context of Vishamashana in the present chapter

[20] Consumption of unwholesome food will irritate the mucosa of whole alimentary canal, which further promotes the hypermotility of the alimentary canal. Thus, the person may have digestive impairment

[21] Contraction of mucosa of stomach. This is leading to the hampered secretion of gastric juice. Thus, the person develops the loss of appetite in this situation.

[22] Trichobezoar – is a condition where the person develops severe pain in the epigastric region associated with nausea or vomiting and on examination, we may find the swelling in the epigastric region. This occurs in the patient suffering from any psychological disturbance and he has the habit of consuming his/her own scalp hair.

[23] Prolonged malnutrition can reduce metabolism by 20-30%, due to the scarcity of nutrients in the cells. In the final stages of many diseases, the inanition (a state of profound weight loss) that accompanies the disease causes a marked

[24] Refer the context of *Sandharana* in the present chapter

Lakshana of Agni Dushti

तस्य लिङ्गमजीर्णस्य विष्टम्भः सदनं तथा।
शिरसो रुक् च मूर्च्छा च भ्रमः पृष्ठकटिग्रहः॥45॥
जृम्भाऽङ्गमर्दस्तृष्णा च ज्वरश्छर्दिः प्रवाहणम्।
अरोचकोऽविपाकश्च, घोरमन्नविषं च तत्॥46॥
शंसृज्यमानं पित्तेन दाहं तृष्णां मुखामयान्।
जनयत्यम्लपित्तं च पित्तजांश्चापरान् गदान्॥47॥
यक्ष्मपीनसमेहादीन् कफजान् कफसङ्गतम्।
करोति वातसंसृष्टं वातजाश्च गदान् बहून्॥48॥
मूत्ररोगांश्च मूत्रस्थं कुक्षिरोगान् शकृद्गतम्।
रसादिभिश्च संसृष्ट कुर्याद्रोगान् रसादिजान्॥49॥
Ca.Ci. – 15/45-49

- If the agnidushti is occurring it will lead to *Ama, Vishtambha* (reduced movement of intestine), *Sadana* (sluggish movement of body parts), *Shiroruk* (headache), *Murcha* (altered state of consciousness), *Bhrama* (giddiness), *Prishthagraha* (stiffness of back), *Katigraha* (stiffness of waist region), *Jrimbha* (yawning), *Angamarda* (bodyache), *Jvara* (raised body tempearature), *Chardi* (vomiting), *Pravahana* (excess straining for defecation)
- If the *Ama* associated with *Pitta* in the body then it may lead to *Daha* (burning sensation), thrist, diseases of mouth, *Amlapitta* (sour eructations) and other *Pitta* dominant diseases
- If the *Ama* is associated with *Kapha*, then there will be *Yakshma* (a type of *Pranavaha Sroto Vikara*), *rhinorrhoea, Prameha* (group of disorders characterised by excess micturition)
- If *ama* is associated with *Vata*, then *Vatarogas* are observed
- *Mutravaha Sroto Vikara* are observed in case of *Ama* is present in *Mutra, Purishavaha Sroto Vikara* are seen in case of *Ama* in abdomen, and *Rasavaha* etc *Sroto Vikaras* will be manifested if *Ama* is present in *Rasa* etc *Dhatu*.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Ashtanga Sangraha excerpts
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders publication, 2006
3. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
4. Website materials

Key points of the chapter

- आयुर्वर्णो बलं स्वास्थ्यमुत्साहोपचयौ प्रभा। ओजस्तेजोऽग्नयः प्राणाश्चोक्ता देहाग्निहेतुकाः॥3॥ Ca.Ci. – 15/3 Properly functioning of Agni is responsible for longevity, complexion, strength, health, enthusiasm, nourishment, lustre, immunity, temperature and proper functioning of other Agnis – Dhatvagni and Bhutagni.
- Among the types of Agni, Jatharagni is main type of Agni, as it controls other types of Agni. Depending upon the Dosha dominance in the body, 4 types of Agni are described in Ayurveda – Vishamagni due to the dominance of Vata Dosha; Tikshnagni due to the dominance of Pitta Dosha; Mandagni due to the dominance of Kapha Dosha and Samagni due to the balanced Tridosha in the body.

- अन्नमादानकर्मा तु प्राणः कोष्ठं प्रकर्षति। तद्द्रवैर्भिन्नसंघातं स्नेहेन मृदुतां गतम्॥
- समानेनावधूतोऽग्निरुदर्यः पवनोद्वहः। काले भुक्तं समं सम्यक् पचत्यायुर्विवृद्धये॥ Ca.Ci. – 15/6-7 This verse highlights the process of digestion inside the body. Pranavata moves the ingested food into Koshtha or Mahasrotas (alimentary canal) and this is stored in Amashaya. In the Amashaya, macromolecules of ingested food are acted upon by Drava (liquid) and Snigdha (unctuous) qualities along with the support of Samana Vata and Pachaka Pitta. त्यग्निः, स दुष्टोऽन्नं न तत् पचति लघ्वपि। अपच्यमानं शुक्तत्वं यात्यन्नं विषरूपताम्॥44॥ Ca.Ci. – 15/44 Due to various reasons of Agni Dushti, impaired Agni will not be in a position to digest even Laghu (light to digest) substances. This process will be responsible for process of Shuktatva or Amlibhava (fermentation) further leading to the formation of Amavisha.

Probable questions may be asked in the examination

Long essays

- Discuss the role of Agni in Vyadhi Samprapti
- Describe the Nidana of Agnidushti and Lakshana of Agnidushti
- Define Agni and Ama. Classify Agni. Mention the properties of Ama. Describe the properties of Sama Vayu, Sama Pitta and Sama Kapha.

Short essays

- Describe the role of Agni in the manifestation of disease
- Describe Agnidushti Nidana

Short answers

- Functions of Agni
- Agni Pariksha
- Types of Agni according to Dosha

MCQs

1. **Ingestion of food into Koshtha through mouth is occurring due to**
   a. Samana Vata;
   b. Udana Vata;
   c. Prana Vata;
   d. Kledaka Kapha
   Answer -(c)
2. **Mandagni is due to the dominance of …………… Dosha.**
   a. Kapha;
   b. Pitta;
   c. Vata;
   d. All of the above
   Answer -(a)
3. **Among the types of Agni, which of the following is considered as Pradhana?**
   a. Jatharagni;
   b. Bhutagni;
   c. Dhatvagni;
   d. Tikshnagni
   Answer -(a)
4. **Sukshma (minute) portion formed due to Rakta Dhatvagni leads to**
   a. Nourishment of Rakta Dhatu;
   b. Nourishment of Mamsa Dhatu;
   c. Nourishment of Pitta;
   d. All of the above
   Answer -(b)
5. **Malamsha formed out of Mamsa Dhatvagni Paka is**
   a. Kapha;
   b. Pitta;
   c. Khamala;
   d. Sveda
   Answer -(c)

***

Definition of Ama and Samanya Lakshana

7

Learning objectives

- ⇨ To learn various definitions of Ama
- ⇨ To know the clinical features of Ama
- ⇨ To know the relevance of Ama

Human beings consume different kinds of food substances having different qualities, *Virya*, (potency) in different amount depending upon the customs followed in a particular locality and special affinity. The body needs adequate functioning of *Jatharagni* (digestive fire) to convert these diverse food substances to get digested, to transform from macro molecules to micro molecules so that absorption and assimilation takes place in the body. Due to various reasons, the digestive fire or *Jatharagni* cannot perform the digestion of ingested food and leads to the formation of *Ama* in the body. For example, if the person is residing Northern in Southern part of India and he is forced to take the food substances prepared out of coconut oil, then it is little bit difficult to have the digestion of food. In the same way, if a person from South India, goes to Punjab or other Northern part of India, and he is forced to take the food substances prepared out of mustard oil, then it is very difficult for the person to have the complete digestion of ingested food.

The word *Ama* refers to the undigested food material found in *Amashaya*. In other words, *Ama* is any factor which enters into the body and is unable to form the micro nutrient form from macro nutrient. Thus *Ama* is an exogenous substance which does not get transformed into the form usable by human body. Thus, any molecule larger than micronutrient glucose, amino acid and fatty acids and glycerol, is considered as *Ama*.

There are several definitions of *Ama* found in textbooks of *Ayurveda*. These definitions indicate the *Ama* which may be of either due to weak *Jatharagni* or weak *Dhatvagni*. In the following pages, we are analysing these definitions.

ऊष्मणोऽल्पबलत्वेनधातुमाद्यमपाचितम्।
दुष्टमामाशयगतंरसमामंप्रचक्षते॥ A.Hr.Su. – 13/25

Due to the weakness or hampered function of *Jatharagni*, the first *Dhatu* (*Rasa Dhatu*) becomes poorly formed. Due to poor digestion, improperly formed metabolic product residing in *Amashaya* is termed as *Ama*.

आमाशयस्थःकायाग्नेदौर्बल्यादविपाचितः।
आद्यःआहारधातुर्यःसआमइतिकीर्तितः॥

Madhu, Ma.Ni. – 25/1-2

If the *Kayagni* (*Jatharagni*) in *Amashaya* fails to perform its normal functions leads to the accumulation of undigested food material in the *Amashaya* and it is initial *Dhatu* or *Rasa Dhatu* is called *Ama*.

आहारस्यरसःशेषोयोनपक्वोऽग्निलाघवात्।
समूलंसर्वरोगाणामामइत्यभिधीयते॥

Madhu, Ma.Ni. – 25/1-2

Due to the hampered function of *Jatharagni*, proper digestion of ingested food will not happen which in turn result in the formation of *Ama* in *Amashaya* and it is the root cause of the all diseases.

अविपक्वमसंयुक्तंदुर्गन्धंबहुपिच्छिलम्।
सदनंसर्वगात्राणामामइत्यभिधीयते॥

Madhu, Ma.Ni. – 25/1-2

The food which is not properly digested, having foul smell, with excess sliminess and

the final outcome is sluggish movements of all parts of the body is called *Ama*.

आममन्नरसंकेचित्, केचित्तुमलसंचयम्।
प्रथमांदोषदुष्टिंचकेचिदामंप्रचक्षते॥

Madhu, Ma.Ni. – 25/1-2

As per this description, there are three different meanings for the term Ama.

- ⇨ Improperly digested food which remain in the *Amashaya* secondary to poor *Jatharagni*
- ⇨ Accumulation of *Mala* in different *Dhatu* due to poor functioning of *Dhatvagni*
- ⇨ This is nothing but *Achayapurvaka Prakopa* stage of *Dosha* vitiation or primary stage of vitiation of *Dosha* where sudden onset of the disease can happen.

अन्येदोषेभ्यएवातिदुष्टेभ्योऽन्योन्यमूर्च्छनात्।
कोद्रवेभ्योविषस्यैववदन्त्यामस्यसंभवम्॥

A.Hr.Su. – 13/26; Madhu, Ma.Ni. – 25/1-2

As per some other opinion, *Ama* will be formed after mixing with vitiated *Doshas* like the formation of poison after mixing with various kinds of *Kodrava*.

द्रवंगुर्वनेकवर्णहेतुःसर्वरोगाणां स्निग्धं पिच्छिलमामं तन्तुमदनुबद्धशूलं दुर्गन्धिइत्यादि॥ अरुण,

अ.हृ.सू.-13/27

- ⇨ *Guru* – heavy to get digested
- ⇨ *Drava* – liquid in consistency
- ⇨ *Hetu Sarvaroganam* – root cause for all diseases
- ⇨ *Snigdha* – unctuous in nature
- ⇨ *Picchila* – slimy
- ⇨ *Tantumat* – having thready nature
- ⇨ *Anubaddha Shula* – associated with pricking type of pain in the abdomen
- ⇨ *Durgandhi* – presence of foul smell

Interpretation[1] of Ama

- ⇨ Ingested food substance not getting digested in *Amashaya* and stagnated in *Amashaya*
- ⇨ *Ahara Rasa* (nutritive substance) not formed in *Amashaya* due to poor *Jatharagni*
- ⇨ Improperly digested material present in small or large intestines or both
- ⇨ Remnant of *Ahara Rasa* (nutritive substance) remaining in *Mahasrotas* (alimentary canal) after the absorption of *Ahara Rasa* from *Mahasrotas* into *Rasa Dhatu*
- ⇨ The first phase of *Dosha* vitiation or *Dosha Dushya Sammurchana*
- ⇨ Improperly digested material even present in the *Dhatu* level (*Agnimandya* in *Dhatvagni* level)

Causes[2] of formation of Ama

अभोजनादजीर्णातिभोजनाद्विषमाशनात्।
असात्म्यगुरुशीतातिरूक्षसंदुष्टभोजनात्॥42॥
विरेकवमनस्नेहविभ्रमाद्याधिकर्षणात्।
देशकालर्तुवैषम्याद्वेगानां च विधारणात्॥43॥

Ca.Ci. – 15/42-43

- ⇨ *Abhojana* – if the person is not taking the food substances or in the state of fasting
- ⇨ *Ajirne Atibhojana*– excess consumption of food substances in the state of *Ajirna* or indigestion

G K

[1] 1. Unformed chyme
2. Larger carbohydrate compounds
3. Proteins which are not in the form of dipeptide, amino acids
4. Fats not transformed in the form of fatty acids
5. Presence of helminthes in the gut
6. Presence of pathogenic microorganisms in the gut
7. Exogenous microorganisms in the circulation
8. Auto antigen
9. Malformed cells/tissues
10. Intermedary metabolic products

[2] For interpretation of causative factors of Ama, refer the context of causative factors of Agni Dushti.

- ⇨ ***Vishamashana***– consumption of the food substances at improper time and at improper quantity
- ⇨ ***Asatmya Bhojana***– consumption of unwholesome food substances
- ⇨ ***Guru Bhojana***– consumption of substances heavy to digest
- ⇨ ***Shita Bhojana***– consumption of substances having cold potency
- ⇨ ***Atiruksha Bhojana***– consumption of substances having dry quality
- ⇨ ***Sandushta Bhojana***– consumption of food substances having the presence of body hairs, small stones or small worms etc
- ⇨ ***Virechana, Vamana* and *Sneha Vibhrama***– performing improper diet and regimen after undergoing *Vamana, Virechana* and *Snehana* therapy
- ⇨ ***Vyadhi Karshana***– if the person is suffering from chronic debilitating illness
- ⇨ ***Desha Vaishamya***– if the person is residing in the place where he is not habituated for example, a person from *North India* forced to live in Southern India, where he is forced to take the substances prepared from coconut oil in stead of the substances prepared from mustard oil
- ⇨ ***Kala Vaishamya***– if the person is residing in the time not conducive to the functioning of *Agni*, for example, when the person is exposed to cold environment, he is likely to take more food substances
- ⇨ ***Ritu Vaishamya***– if the person is not following proper diet and regimen related to a particular season. For example, in *Hemanta Ritu*, one should take more amount of substances which are heavy to digest and the person is consuming only lighter substances, that will impair the functioning of *Agni*.
- ⇨ ***Vega Vidharana***– suppression of natural urges, for example, if the person is suppressing the urge of defecation, then the person will have the sequential affliction of *Apana Vata, Samana Vata* and *Prana Vata*. Thus, the person may have digestive impairment.

Samanya Lakshana of Ama

स्रोतोरोधबलभ्रंशगौरवानिलमूढताः।
आलस्यापक्तिनिष्ठीवमलसंगारुचिक्लमाः॥
लिङ्गंमलानांसामानांनिरामाणांविपर्ययः।

The common Lakshana observed in Ama Avastha

- ⇨ *Srotorodha*[3] – obstruction of *Srotas*
- ⇨ *Bala bhramsha* – loss of strength[4]
- ⇨ *Gourava* – heaviness of abdomen or different parts of the body[5]
- ⇨ *Anila Mudhata* – reduced or loss of movement of the *Vata* in the body[6]
- ⇨ *Alasya* – laziness[7]
- ⇨ *Apakti* – impaired digestion[8]
- ⇨ *Nishtiva* – production of sputum[9]
- ⇨ *Malasanga* – obstruction of *Mala*[10]
- ⇨ *Aruchi* – tastelessness[11]
- ⇨ *Klama* – exhaustion without any activities[12]

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[3] Due to the accumulation of incompletely digested food products, there will be *Gaurava* (heaviness) in the body. This concept is termed as *Mala Sanchaya*. This can occur in the alimentary canal level and in the tissue level. Due to this quality, sluggish movement of *Srotas* will be observed in any of the area where accumulation of intermediary metabolic products takes place. This could be the probable reason for the manifestation of *Srotorodha* in the body. Initiation of any disease process is leading to the formation of antigens. By composition, antigens are nothing but proteins. These are heavy molecules. When the number of antigens is increased, they are responsible for the production of antibodies in the body. Both of these are leading to increase of viscosity of the blood. When the viscosity of the blood or fluid is increased, there will be slowness in the movement of fluid in the body.

[4] When the person is having disturbance in the functioning of Agni, then proper end products of the metabolism are not formed. This leads to the state of malnutrition. It is also being said that prolonged malnutrition can decrease the metabolic rate 20-30%, due to the scarcity of nutrition to the cells. Thus, fatigue may be observed in the people having *Ama* in the body.

[5] This is the accompaniment of *Srotorodha*

Chapter Resources

1. Madhava Nidana, Charaka Samhita, Ashtanga Hridaya excerpts
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders publications, 2006
3. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
4. Website materials

GK

[6] Due to the presence of *Picchila, Guru, Abhishyandi* qualities in the *Mahasrotas*, there will be sluggish movement observed in the same.

[7] This is the accompaniment of *Srotorodha*

[8] Impaired digestion in the person having *Ama* can be multifactorial. As stated earlier, the term *Ama* refers to the products staying the *Amashaya* (stomach) for longer duration. The probable hypotheses regarding the impaired digestion and the presence of *Ama* are

1. When the stomach, duodenum becomes distended, that may stimulate the stretch inhibitory signals from vagus nerve suppressing the feeding and thereby reducing the desire to consume food.
2. Various oral factors such as chewing, salivation, swallowing or tasting will regulate/ reduce the intake of food when it passes from the mouth by inhibiting the hypothalamic feeding centre.

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1. When the stomach, duodenum becomes distended, that may stimulate the stretch inhibitory signals from vagus nerve suppressing the feeding and thereby reducing the desire to consume food.
2. Various oral factors such as chewing, salivation, swallowing or tasting will regulate/ reduce the intake of food when it passes from the mouth by inhibiting the hypothalamic feeding centre.

[12] This is attributable to the lack of nutrition supply to the skeletal muscles due to impaired digestion.

Key points of the chapter

⇨ **ऊष्मणोऽल्पबलत्वेनधातुमाद्यमपाचितम्। दुष्टमामाशयगतंरसमामंप्रचक्षते॥**A.Hr.Su. – 13/25 The word Ama refers to the undigested food material found in Amashaya due to hampered function of Agni.

⇨ **अविपक्वमसंयुक्तंदुर्गन्धंबहुपिच्छिलम्। सदनंसर्वगात्राणामामइत्यभिधीयते॥** Madhu, Ma.Ni. – 25/1-2 The food which is not properly digested, having foul smell, with excess sliminess and the final outcome is sluggish movements of all parts of the body.

⇨ **आममन्नरसंकेचित्, केचित्तुमलसंचयम्। प्रथमांदोषदुष्टिंचकेचिदामंप्रचक्षते॥** Madhu, Ma.Ni. – 25/1-2 Three different meanings for Ama can be derived. Improperly digested food which remain in Amashaya; accumulation of Mala in different Dhatu due to poor functioning of Dhatvagni and Achayapurvaka Prakopa where sudden onset of the disease occurs.

⇨ Faulty diet is the main reason for the production of Ama.

⇨ **स्रोतोरोधबलभ्रंशगौरवानिलमूढता:। आलस्यापक्तिनिष्ठीवमलसंगारुचिक्लमा:॥**

Obstruction of channels, loss of strength, heaviness of the abdomen or different parts of the body, reduced or loss of movement of Vata in the body, laziness, impaired digestion, production of sputum, obstruction to the movement of Mala, tastelessness and exhaustion without any activities are observed generally in the presence of the Ama inside the body.

Probable questions may be asked in the examination

Long essays:

⇨ Describe various definitions of Ama and explain the Samprapti and Lakshana of Ama

⇨ Define Ama, describe Sama Dosha and Dushya Lakshana, explain the importance of Srotas in Vyadhi formation

⇨ Explain Saama and Nirama Roga

⇨ Write definition, causes and Samanya Lakshana of Ama

⇨ Write definition, Samanya Lakshana of Ama and describe Saama and Nirama Dosha Lakshana

Short essays

⇨ Describe Ama

⇨ Ama Svarupa and Nirama Lakshana

⇨ Explain Samanya Lakshana of Ama

⇨ Explain Saama Avastha

Short answers:

⇨ Define Ama

⇨ Ama Lakshana

⇨ Ama Svarupa

MCQs

1. **Generally, features of Ama resemble with which of the following?**
   a. Vata;
   b. Pitta;
   c. Kapha;
   d. None of the above
   Answer -(c)
2. **The description of 'Amam Annarasam Kechit.........' is seen in**
   a. Charaka Samhita;
   b. Sushruta Samhita;
   c. Ashtanga Hridaya;
   d. Madhava Nidana
   Answer -(d)
3. **As per Vagbhata, Ama occurs due to poor functioning of**
   a. Jatharagni;
   b. Rasa Dhatvagni;
   c. Bhutagni;
   d. All of the above
   Answer -(a)
4. **As per the definition of Ama 'Ushmano Alpabalatvena' given by Vagbhata, the site of Ama is**
   a. Rasa Dhatu;
   b. Amashaya;
   c. Different Dhatu;
   d. All of the above
   Answer -(b)
5. **Various definitions of Ama in Madhava Nidana are seen in .... Chapter.**
   a. Jvara Nidana;
   b. Kshatakshina Nidana;
   c. Vatavyadhi Nidana;
   d. Amavata Nidana
   Answer -(d)

***

Sama Nirama Dosha and Dushya Lakshana

8

Learning objectives

- By learning the above informations, one can able to decide the stage of the disease process whether Sama stage or Nirama stage
- This information is helpful in management of the disease

Meaning of the term 'Sama' and 'Nirama'

You have already learnt the meaning of *Ama* i.e. the undigested remnants of food remained in the *Koshtha* or *Shakha*. If this *Ama* mixes with the *Dosha* then it is termed as *Sama* and if the *Ama* gets detached from the *Dosha* then it is termed as *Nirama*. The knowledge of *Samatva* and *Niramatva* will be helpful in planning the treatment. If the person shows the *Lakshana* related to *Samatva*, one has to plan the *Dipana* and *Pachana* line of treatment till the person develops the *Lakshana* related to *Samatva* disappears which will be followed by either *Sodhana* or *Samana* therapy depending upon the *Rogabala* and *Rogibala*. If the clinician observes only *Nirama Lakshana*, he can plan the treatment without adopting the *Dipana* and *Pachana* line of treatment, straight away he can adopt either *Sodhana* or *Samana* treatment depending upon the *Rogibala* and *Rogabala*.

Sama and Nirama Dosha Lakshana

Sama and Nirama Vata Lakshana

***Sama Vata Lakshana*:** The term *Sama Vata Lakshana* refers to the group of symptoms when *Ama* (intermediary products of metabolism) mixes with *Vata Dosha*. The clinical features observed during this stage usually starts from prime location of *Vata Dosha* i.e. *Pakvashaya*.

वायुः सामो विबन्धाग्निसादस्तन्द्रान्त्रकूजनैः।
वेदनाशोफनिस्तोदैः क्रमशोङ्गानि पीडयन्॥
विचरेद्युगपच्चापि गृह्णाति कुपितो भृशम्।
स्नेहाद्यैर्वृद्धिमाप्नोति सूर्यमेघोदये निशि॥

Ma.Ni. – 1/5, Madhu

- *Vibandha* (*Apravritti* of *Purisha* or constipation)[1],
- *Agnisada* (*Agnimandya* or reduced digestive function)[2],
- *Sada* (sluggish activities)[3],
- *Tandra* (drowsiness, a state prior to sleep)[4],

G K

[1] When an individual does not allow defecation to occur when he gets the natural call, then these defecation reflexes themselves become progressively less strong over the months or years and the colon becomes atonic. That means the person will frequently suffer from constipation. Due to the presence of undigested material in the stomach, that will lead to the sluggish peristaltic movement. This phenomenon further diminishes the peristaltic activity in the distal portions of alimentary canal. Thus, the person likely to develop constipation.

[2] There will be reduced digestion and assimilation in the small intestine due to the sluggish movements occurring in the alimentary canal from stomach to the ileocaecal junction. Due to reduced digestion in the stomach and intestine, intermediate products of metabolism cannot be converted into micro nutrients, thereby these intermediate metabolic products will be expelled out via faecal matter.

[3] Sluggish activities can be either sluggish activities in the alimentary canal and sluggish movements in different parts of the body.

[4] It is being said that sleep is responsible for the reduction in metabolic rate for about 10-15% below normal

- *Antrakujana* (*Gudugudayana Sabda* or gurgling sounds in the abdomen)[5],
- *Vedana* (pain)[6],
- *Sotha* (swelling)[7],
- *Nistoda* (pricking type of pain) will be observed in different parts of the body.
- During *Samavastha*, the *Dosha* will travel all over the body and shows *Sarvadaihika Lakshana* (systemic symptoms).
- The clinical features aggravate during the application of *Sneha* or during early morning or during cloudy days and during night time.
- If you look into the *Lakshana* of *Sama Vata* it is difficult to predict which *Lakshana* appear during initial phase and which *Lakshana* appear later. When you analyse the clinical features described in *Saama vata* state, most of the features start to appear from lower abdomen.

***Nirama Vata Lakshana*:** In this stage, there will be reduction in *Snigdha* (unctuousness) and disappearance of symptoms observed in *Sama Vata* state.

निरामो विशदो रूक्षो निर्विबन्धोऽल्पवेदनः।
विपरीतगुणैः शान्तिं स्निग्धैर्याति विशेषतः॥

Ma.Ni. – 1/5, Madhu

- *Vishada* (clarity)[8],
- *Ruksha* (dry or reduced *Snigdha* quality),
- *Nirvibandha* (proper Purisha Pravritti)[9],
- *Alpavedana* (severity of the pain will be reduced)[10] and
- Relief of the symptoms on application of *Sneha*, during morning time and during day time and during cloudy days.

Sama and Nirama Pitta Lakshana

***Sama Pitta Lakshana*:** The clinical features mentioned in the context of *Sama Pitta* are suggestive of the pathological process occurring in the middle portion of alimentary canal.

G K

during sleep. In the person who is having *Ama*, this phase of sleep is increased, thereby leading to the further reduction in metabolic rate, the final outcome is metabolic derangement in the body.

[5] This is attributable to obstructive lesions of gastro intestinal tract. Due to constipation, loud and harsh peristaltic sounds are heard on auscultation.

[6] Pain in the alimentary canal can be attributable to two mechanisms
Spasm of portion of alimentary canal leads to the stimulation of pain nerve endings. There is another hypothesis that is, diminished blood flow to the contracted muscle, leading to ischemic pain. Muscle cramps of the muscles of alimentary canal are another possible mechanism of pain in case of spasm of the muscles of alimentary canal.

1. Overdistension of hollow viscus leads to the overstretch of the tissues, thereby resulting in ischemic type of pain.
2. As far as pain in different parts of the body are concerned, 3 possible mechanisms of pain generation are explained.
3. Chemicals secreted by damaged tissue
4. Tissue ischemia
5. Muscle spasm
6. The intensity of pain depends upon rate of damage to the tissues due to bacterial infection or tissue ischemia or tissue contusion.

[7] Swelling is usually observed when there is damage to the tissue which further results in slowing of circulation of damaged part, thereby inflammatory changes can be seen.

[8] This is attributable to the decrease in the *Samatva* in the body which has Guru (heavy to digest), *Snigdha* (unctuousness), *Abhishyandi* (quality of obstruction in the channel)

[9] When the person is having adequate digestive function of stomach and duodenum, proper peristaltic movements start to occur (stretch of the gastric and duodenal muscles will be reduced), thus leading to activation of gastrocolic and duodenocolic reflexes. These reflexes initiate mass movements in distal part of the large intestine.

[10] This is attributable to proper gastro intestinal motility.

दुर्गन्धं हरितं श्यावं पित्तमम्लं स्थिरं गुरु।
अम्लिकाकण्ठहृद्दाहकरं सामं विनिर्दिशेत्॥
Ma.Ni. – 1/5, Madhu

- *Durgandha* (foul smell)[11],
- *Harita* (greenish discolouration of vomitus [12]or body parts),
- *Syava* (blackish discolouration of vomitus[13] or body parts);
- *Sthira* (firm consistency),
- *Guru* (heavy in quality)[14];
- *Amlika Kantha Hriddaha kara* (sour eructations and burning sensation in throat and chest region)[15].

Nirama Pitta Lakshana

आताम्रपीतमत्युष्णं रसे कटुकमस्थिरम्।
पक्वं विगन्धं विज्ञेयं रुचिपक्तिबलप्रदम्॥
Ma.Ni. – 1/5, Madhu

- *Atamra Pita Varna* (coppery colouration or yellowish discolouration of vomitus)[16];
- *Katu rasa* (pungent taste in the mouth),
- *Asthira* (loss of firm consistency), a state where *Samatva* state is relieved.
- *Vigandha* (loss of foul smell);
- *Ruchipakti* and *bala prada* (responsible for proper taste and proper digestion and appropriate strength of the individuals)

Sama and Nirama Kapha Lakshana

Sama Kapha Lakshana: The clinical features mentioned in the context of *Sama Kapha* are suggestive of pathological process happening in the upper part of the body.

आविलस्तन्तुलः स्त्यानः कण्ठदेशेऽवतिष्ठते।
सामो बलासो दुर्गन्धः क्षुदुद्गारविघातकृत्॥
Ma.Ni. – 1/5, Madhu

- *Avila* (*kapha* will be turbid),
- *Tantula* (thready consistency);
- *Styana* (*Ghana* or hard),
- *Kantha Deshe Avatishtate* (sticky nature in throat region),
- *Durgandha* (foul smell)[17],
- *Kshud Vighata* (loss of digestive fire or appetitite),
- *Udgara Vighata* (absence of belching)

Nirama Kapha Lakshana

फोनवान् पिण्डितः पाण्डुः निःसारोऽगन्ध एव च।
पक्वः एव स विज्ञोयश्छेदवान् वक्त्रशुद्धिकृत्॥
Ma.Ni. – 1/5, Madhu

- *Phenavan* (foams will be observed in the mouth),

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[11] This is attributable to the vomitus which contains undigested food material from the stomach and the presence of bile in the vomitus

[12] This is attributable to the presence of biliverdin (greenish discolouration) in the vomitus

[13] This is attributable to the bleeding in the stomach in which hydrochloric acid interacts with haemoglobin giving coffee ground appearance to the vomitus.

[14] These two are the *Lakshana* attributable to the *Samatva* in the alimentary canal. Here, most of the clinical features are noted are usually suggestive of middle portion of alimentary canal (stomach and duodenum)

[15] This is attributable to the reverse peristaltic movement of the contents of the stomach

[16] Greenish discolouration of the skin and mucosa is occurring in the patient due to the accumulation of the biliverdin which is a breakdown product of porphyrin which is further the breakdown product of hemoglobin. Biliverdin is the substance formed during the breakdown of hemoglobin. This will be further reduced to bilirubin. Bilirubin is entering into liver. In the liver, conjungation of bilirubin occurs and this is going to enter the alimentary canal resulting in the yellowish coloured vomiting. In a 70 kg adult, about 200 mg of bilirubin is derived from the breakdown of hemoglobin, is excreted by the liver daily.

[17] Thick viscid sputum sometimes takes the shape of bronchial casts is observed in case of chronic obstructive pulmonary diseases or bronchial asthma. This takes the shape of thread and very hard to spit it out. The presence of turbidity refers to the continuation of pathological process in the respiratory airways

- *Pindita* (thready nature will be lost and small bolus nature will be seen);
- *Pandu* (yellowish white discolouration),
- *Nissara*,
- *Agandha* (no foul smell),
- *Chedavan* (sticky nature of *Kapha* in the throat will be lost and *Kapha* will come out of the mouth easily),
- *Vaktrashuddhi* (cleanliness of the mouth)

All the above said features of *Nirama Kapha* are said to be indicative of reversal of pathological process.

As far as *Sama* and *Nirama Dhatus* are concerned, no description of *Sama* and *Nirama Dhatu* are observed in textbooks of *Ayurveda*. There is description of *Dhatu Pradoshaja Vikara*[18]. These are considered to be *Sama Dhatu Lakshana*.

Saama Rasa Dhatu Lakshana

अश्रद्धा चारुचिश्चास्यवैरस्यमरसज्ञता।
हृल्लासो गौरवं तन्द्रा साङ्गमर्दो ज्वरस्तमः॥9॥
पाण्डुत्वं स्त्रोतसां रोधः क्लैब्यं सादः कृशाङ्गता।
नाशोऽग्नेरयथाकालं वलयः पलितानि च॥10॥
रसप्रदोषजा रोगा, Ca.Su. – 28/9-11

तत्र अन्नाश्रद्धारोचकाविपाकङ्गमर्दज्वरहृल्लासतृप्तिगौरवहृत्पाण्डुरोगमार्गोपरोधकार्श्यवैरस्याङ्गसादाकालवलीपलितदर्शनप्रभृतयो रसदोषजा विकाराः;
Su.Su. – 24/9

- *Asraddha* (though the person takes food, one will not be having any craving for food);
- *Aruchi* (the person will not take food or there will be tastelessness);
- *Asyavairasya* (the person will be having perception of improper taste);
- *Arasajnata* (the person will not be having perception of taste);
- *Hrillasa* (nausea);
- *Gourava* (heaviness of the body);
- *Tandra* (drousiness);
- *Sangamarda* (pain all over the body or *myalgia*);
- *Jvara* (raised body temperature);
- *Tama* (blackout or darkness in front of the eyes);
- *Pandutva* (yellowish white discolouration of body or anemia);
- *Sroto Rodha* (obstruction in *Srotas*) or *Margoparodha* (obstruction in different *Marga* or channels)
- *Klaibya* (inability to perform sexual activity);
- *Sada* or *Angasada* (reduced activity of body parts);
- *Krishangata* or *Karshya* (emaciation of the body);
- Agninasha (decreased function of digestive fire);
- *Vali* and *Palita* in *Ayathakala* (premature development of wrinkles and greying of scalp hair)
- *Tripti* (early satiety)
- *Hridroga* (heart disease)

Saama Raktadhatu Lakshana

वक्ष्यन्ते रक्तदोषजाः।
कुष्ठवीसर्पपिडका रक्तपित्तमसृग्दरः॥11॥
गुदमेढ्रास्यपाकश्च प्लीहा गुल्मोऽथ विद्रधिः।
नीलिका कामला व्यङ्गः पिप्लवस्तिलकालकाः॥12॥
दद्रुश्चर्मदलं श्वित्रं पामा कोठास्त्रमण्डलम्।
रक्तप्रदोषाज्जायन्ते, Ca.Su. – 28/11-13

काराः; कुष्ठविसर्पपिडकामशकनीलिकातिलकाल- कन्यच्छव्यङ्गेन्द्रलुप्तप्लीहविद्रधिगुल्मवातशोणिता-र्शोऽर्बुदाङ्गमर्दासृग्दररक्तपित्तप्रभृतयो रक्तदोषजाः; गुदमुखमेढ्रपाकाश्च।
Su.Su. – 24/9

- *Kushtha* (any skin disease);
- *Visarpa* (disease which spreads rapidly);
- *Pidaka* (boils);

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[18] The interpretations of these descriptions are dealt in the context of concept of *Srotas*.

- ⇨ *Raktapitta* (bleeding diathesis);
- ⇨ *Asrikdara* (excess menstrual flow);
- ⇨ *Gudapaka;*
- ⇨ *Medhrapaka;*
- ⇨ *Asyapaka;*
- ⇨ *Pliharoga* (disease involving *Pliha* or spleen);
- ⇨ *Gulma* (abdominal swelling);
- ⇨ *Vidradhi* (abscess);
- ⇨ *Nilika;*
- ⇨ *Kamala* (jaundice);
- ⇨ *Vyanga;*
- ⇨ *Piplava;*
- ⇨ *Tilakalaka;*
- ⇨ *Dadru;*
- ⇨ *Charmadala;*
- ⇨ *Svitra* (vitiligo);
- ⇨ *Pama;*
- ⇨ *Kotha;*
- ⇨ *Asramandala*
- ⇨ As per *Sushruta, Mashaka*
- ⇨ *Nyaccha*
- ⇨ *Indralupta*
- ⇨ *Vatashonita*
- ⇨ *Arshas*
- ⇨ *Arbuda*
- ⇨ *Angamarda*

Saama Mamsa Dhatu Lakshana

शृणु मांसप्रदोषजान्॥13॥
अधिमांसार्बुदं कीलं गलशूलकशुण्डिके।
पूतिमांसालजीगण्डगण्डमालोपजिह्विकाः॥14॥
विद्यान्मांसाश्रयान्,

Ca.Su. – 28/13-14

गुदमुखमेढ्रपाकाश्च अधिमांसार्बुदार्शोऽधिजिह्वोपजिह्वोपकुशगलशुण्डिकालजीमांससंघातौष्ठप्रकोपगलगण्डमालाप्रभृतयो मांसदोषजाः; ग्रन्थिवृद्धि

Su.Su. – 24/9

- ⇨ *Adhimamsa* (excess growth of muscles);
- ⇨ *Arbuda* (neoplasms);
- ⇨ *Kila;*
- ⇨ *Galashaluka;*
- ⇨ *Galashundika;*
- ⇨ *Putimamsa;*
- ⇨ *Alaji;*
- ⇨ *Galaganda;*
- ⇨ *Gandamala;*
- ⇨ *Upajihvika*
- ⇨ *Arshas*
- ⇨ *Upakusha*
- ⇨ *Mamsasanghata*
- ⇨ *Oshtha Prakopa*

Saama Medo Dhatu Lakshana

मेदःसंश्रयांस्तु प्रचक्ष्महे।
निन्दितानि प्रमेहाणां पूर्वरूपाणि यानि च॥15॥

Ca.Su. – 28/15

पगलगण्डमालाप्रभृतयो मांसदोषजाः; ग्रन्थिवृद्धिगलगण्डार्बुदमेदोजौष्ठप्रकोपमधुमेहातिस्थौल्यातिस्वेदप्रभृतयो मेदोदोषजाः; अध्यस्थ्यधिदन्तास्थि।

Su.Su. – 24/9

- ⇨ *Atisthoulya* (obesity)
- ⇨ *Prameha Purvarupa* (premonitory symptoms suggesting *Prameha*) such as *Jatilibhava* of *Kesha* (roughness of scalp hairs), *Asyamadhurya* (sweetish taste in the mouth), *Karapadayoh Suptata* and *Daha* (numbness or burning sensation in the palms and soles), *Mukhatalukanthashosha* (dryness of mouth, palate and throat), *Pipasa* (thirst), *Alasya* (laziness), *Kaye Mala* (accumulation of waste products or metabolites in the body), *Kayachidreshu Upadeha* (obstruction of different body orifices), *Angeshu Paridaha* and *Suptata* (burning sensation and numbness in different parts of the body), *Visra Sharira Gandha* (foul smell from the body), *Nidra* (excess sleep) and *Tandra* (drousiness), *Shat Pada, Pipilikabhi Sharira Mutrabhisarana* (attraction of

- ⇨ *Granthi* (cystic swelling)
- ⇨ *Vriddhi* (hernia)
- ⇨ *Galaganda* (swelling around the neck)
- ⇨ *Arbuda* (tumour)
- ⇨ *Medoja Oshtha Vikara* (disease of lips where in *Medo Dhatu* is afflicted)
- ⇨ *Madhumeha* (diabetes mellitus) type of *Prameha* having *Vata Dosha* dominance
- ⇨ *Atisveda* (profuse sweating)

Saama Asthi Dhatu Lakshana

अध्यस्थिदन्तौ दन्तास्थिभेदशूलं विवर्णता।
केशलोमनखश्मश्रुदोषाश्चास्थिप्रदोषजाः॥16॥

Ca.Su. – 28/16

स्वेदप्रभृतयो मेदोषजाः; अध्यस्थ्यधिदन्तास्थितोदलशूलकुनखप्रभृतयोऽस्थिदोषजाः; तमोदर्शनम्।

Su.Su. – 24/9

- ⇨ *Adhyasthi* (excess growth of bones);
- ⇨ *Adhidanta* (excess growth of teeth);
- ⇨ *Dantasula* (toothache);
- ⇨ *Asthishula* (pain in bones);
- ⇨ *Dantabheda* (tearing type of pain in teeth);
- ⇨ *Asthibheda* (tearing type of pain in bones);
- ⇨ *Vivarnata* (discolouration);
- ⇨ *Kesha, Loma, Nakha, Smashru Dosha* (defects of scalp hair, body hair, nails and beard)
- ⇨ *Asthitoda* (pricking type of pain in bones)
- ⇨ *Kunakha*[19] (abnormalities of nail)

Saama Majja Dhatu Lakshana

रुक् पर्वणां भ्रमो मूर्च्छा दर्शनं तमसस्तथा।
अरुषां स्थूलमूलानां पर्वजानां च दर्शनम्॥17॥
मज्जप्रदोषात्,

Ca.Su. – 28/17

तोदशूलकुनखप्रभृतयोऽस्थिदोषजाः; तमोदर्शनम्च्छार्भ्रमपर्वगौरवस्थूलमूलोरुजङ्घनेत्राभिस्यन्दप्रभृतयोमज्जदोषजाः; क्लैब्याप्रहर्षशुक्राश्मरीशुक्रमे। Su.Su. – 24/9

- ⇨ *Parvanam Ruk* (pain in joints);
- ⇨ *Bhrama* (giddiness);
- ⇨ *Murccha* (altered state of consciousness);
- ⇨ *Tamo Darshana* (appearance of darkness in front of eyes);
- ⇨ *Arunshi* in *Parva* which are having *Sthulamula* (deep seated or large ulcers in joints)
- ⇨ *Parva Gaurava* (heaviness of the joints)
- ⇨ *Netrabhishyanda* (disease of eye having excess redness and secretion)

Saama Shukra Dhatu Lakshana

शुक्रस्य दोषात् क्लैब्यमहर्षणम्।
रोगि वा क्लीबमल्पायुर्विरूपं वा प्रजायते॥18॥
न चास्य जायते गर्भः पतति प्रस्त्रवत्यपि।
शुक्रं हि दुष्टं सापत्यं सदारं बाधते नरम्॥19॥

Ca.Su. – 28/18-19

तयो मज्जादोषजाः क्लैबव्याप्रहर्षशुक्राश्मरीशुक्रमेहशुक्रदोषाश्च तद्दोषजाः; त्वग्दोषाः सङ्गोऽतिप्रव

Su.Su. – 24/9

- ⇨ *Klaibya* (inability to perform sexual activity or erectile dysfunction)
- ⇨ *Aharshana* (dysfunction related to sexual gratification or lack of libido)
- ⇨ *Kliba, Alpayu* and *Virupa* (the person will be impotent, short life span and disfiguration); his spouse will not be having pregnancy; will be having frequent abortion; his spouse and children will be suffering from illness are usually observed
- ⇨ *Shukrashmari* (spermolith)
- ⇨ *Shukrameha* (excessive micturition with the presence of semen or passing of semen in day or night time or night emission or type of *Kaphaja Prameha*)
- ⇨ *Shukradosha* (abnormalities of semen)

GK [19] *Kunakha* is a disease coming under the description of *Kshudraroga* having the dominance of *Pitta* and *Vata*, involvement of *Mamsa* is seen. This is also called as *Kulina, Chippa, Akshata* or *Upanakha*. In some other textbooks, it is also being termed as *Anguliveshtaka*.

As far as Sama and Nirama Malas are concerned, Sama and Nirama Purisha Lakshana are described.

संसृष्टमेभिर्दोषैस्तु न्यस्तमप्स्ववसीदति।
पुरीषं भृशदुर्गन्धि पिच्छिलं चामसंज्ञितम्।।1 2।।
एतान्येव तु लिङ्गानि विपरीतानि यस्य वै।
लाघवं च विशेषेण तस्य पक्कं विनिर्दिशेत्।।1 3।।

Ma.Ni. – 3/12,13

- ⇨ If the clinician puts some amount of *Purisha* into water, it will sink to the bottom of the vessel or jar;[20]
- ⇨ *Bhrisha Durgandhi* (foul smell)[21],
- ⇨ *Picchila* (sliminess[22] of the *Purisha*).
- ⇨ The opposite of the above *Lakshana* are observed in *Nirama Purisha* state.

Sama and *Nirama Mutra* and *Sveda* stages are not discussed in textbooks of *Ayurveda*. Indirect descriptions related to abnormalities of *Mutra* and *Sveda* are considered in the assessment of *Saama* and *Nirama Mutra*.

Saama Mutra[23] Lakshana

- ⇨ If drop of *Tila Taila* (sesamum oil) floats over urine surface but does not spread indicates the poor prognosis of the disease
- ⇨ If drop of *Tila Taila* (sesamum oil) sinks in urine indicates the incurability of the illness
- ⇨ Increased frequency of micturition
- ⇨ Increased turbidity of urine
- ⇨ When mixes with abnormally increased *Dosha*, various abnormal colours of urine is passed by the individuals
- ⇨ Passes the urine with difficulty or pain

Nirama Mutra Lakshana

प्रमेहिणो यदा मूंत्रपिच्छलमनाविलम्।
विशदं तिक्तकटुकं तदारोग्यं प्रचक्षते।।2 0।।

Su.Chi. – 12/20

- ⇨ Passage of urine which is free from froth
- ⇨ Passage of transparent urine
- ⇨ Passage of clear and non turbid urine
- ⇨ Passage of urine having *Tikta* and *Katu Rasa*
- ⇨ Passing the urine with no pain

Saama Sveda[24] Lakshana

- ⇨ Excess perspiration or absence of perspiration
- ⇨ Roughness
- ⇨ Excessive smoothness of the body
- ⇨ Burning sensation in the skin
- ⇨ Foul smell
- ⇨ Itching

Nirama Sveda Lakshana

- ⇨ Normal perspiration
- ⇨ No roughness
- ⇨ No burning sensation in the skin
- ⇨ No foul smell from the body
- ⇨ No itching

GK

[20] No proper explanation regarding this mechanism in western physiology is being given. This could be attributable to the presence of intermediate metabolic products which are heavier than water in the faecal matter. That could be the reason for the sinking of faecal matter in case of presence of *Ama*.

[21] This is attributable to the amount of bacterial flora present in the colon of the individual and nature of food consumed. Unpleasant odour is attributable to the presence of hydrogen sulphide gas in the faecal matter.

[22] This is attributable to the presence of mucus in the faecal matter. *Hypokalemia* may the sequel of this pathological mechanism

[23] Applied aspect of *Mutra* is being discussed in the context of *Mutravaha Srotodushti Lakshana* and *Mutra Pariksha* in the context of *Ashta Sthana Pariksha*.

[24] Applied aspect of *Sveda* is being explained in the context of *Svedavaha Sroto Vikara*.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Madhana Nidana excerpts
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders publication, 2005
3. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
4. Website materials

Key points of the chapter

- ⇨ When undigested remnants of food remained in the Koshtha (alimentary canal) or Shakha (Tvak and Rakta etc six Dhatus) is termed as Ama. When this Ama gets amalgamated with Dosha, then such Dosha and Dushyas are termed as Saama Dosha and Dushya stage. When the same Ama gets detached with from Dosha and Dushyas, the stage is termed as Nirama Dosha and Dushya stage. This knowledge of Saamatva and Niramatva will be helpful in deciding the plan of treatment.
- ⇨ Saama and Nirama Dosha Lakshana are mentioned in Madhukosha commentary of 1st chapter of Madhava Nidana.
- ⇨ Saama and Nirama Dushya include Saama and Nirama Dhatu and Mala. In Ayurveda literatures, there is no specific mentioning of Saama and Nirama Dhatu. Dushti Lakshana mentioned in the context of Dhatu Pradoshaja Vikara are considered as Saama Dhatu Lakshana and the absence of these Lakshana are termed as Nirama Dhatu Lakshana.
- ⇨ As far as Saama and Nirama Mala Lakshana are concerned, Ayurveda literatures mentioned Saama and Nirama Purisha Lakshana are mentioned. But. Saama and Nirama Mutra and Sveda Lakshana are inferred depending upon the examination of urine and clinical features in relation to abnormal sweating patterns.

Probable questions may be asked in the examination

Long essays

- ⇨ Explain Saama and Nirama Lakshana of Dosha

Short essays

- ⇨ Saama Dosha Dushya Lakshana
- ⇨ Saama Nirama Pitta Dosha Lakshana
- ⇨ Explain Saama and Nirama Kapha Lakshana
- ⇨ Describe Saama and Nirama Vata Lakshana
- ⇨ Discuss Saama and Nirama Purisha Lakshana

Short answers

- ⇨ Write a short note on Saama Vata/ Pitta/ Kapha Lakshana
- ⇨ Write a short note on Nirama Vata/ Pitta/ Kapha Lakshana
- ⇨ Write Saama and Nirama Purisha Lakshana
- ⇨ Write Saama Mala Lakshana

MCQ

1. **Vibandha (constipation) is seen in which of the following stages?**
   a. Saama Vata stage;
   b. Nirama Vata stage;
   c. Saama Pitta stage;
   d. Saama Kapha stage

Answer -(a)

2. **Snigdha (unctuous) line of treatment is helpful in which of the following conditions?**
   - a. Saama Vata stage;
   - b. Nirama Vata stage;
   - c. Saama Pitta stage;
   - d. Saama Kapha stage

   Answer -(b)

3. **Klaibya (erectile dysfunction) is seen in which of the following stage?**
   - a. Saama Rasa stage;
   - b. Saama Rakta stage;
   - c. Saama Medas stage;
   - d. Saama Majja stage

   Answer -(a)

4. **Which of the following is observed in Saama Rakta Dhatu stage?**
   - a. Kamala;
   - b. Raktapitta;
   - c. Kushtha;
   - d. All of the above

   Answer -(d)

5. **Which of the following is/are the features of Saama Purisha Lakshana?**
   - a. Faecal matter will sink in the water;
   - b. Durgandha (foul smell in faecal matter);
   - c. Picchila (slimy nature of faecal matter;
   - d. All of the above

   Answer -(d)

***

Doshapaka and Dhatupaka

9

Learning objectives

- ⇨ By learning the above informations, one can able to decide the stage of the disease process whether Sama stage or Nirama stage
- ⇨ This information is helpful in management of the disease
- ⇨ Identifying the stage of Doshapaka and Dhatupaka in the body
- ⇨ Significance of these stages in the present era

Doshapaka and ***Dhatupaka*** are the stages occur in the body when there is presence of abnormal *Dosha* and *Dhatu* are present in the body. These stages can be identified by the presence of clinical features which are mentioned in the context of *Jwara* by *Madhukosha* commentary of *Madhava Nidana*. *Doshapaka* features signify the improving stage from the illness and *Dhatupaka* stage suggests the worsening situation of the body. In other words, *Doshapaka* is beneficial to the body and *Dhatupaka* is harmful to the body. The cause for the *Doshapaka* and *Dhatupaka* is considered as *Daiva* (supra human power). Literatures say duration of *Dhatupaka* and manifestation of the severe symptoms are as follow:

Doshapaka: *Doshapaka* is also termed as *Malapaka*. It is a form of stage of the disease where *Dosha* will attain *Pakavastha* and the person will have restoration of health owing to the normally functioning *Jatharagni*. This is favourable condition to the patient as the *Ama* will be getting separated from *Dosha*. This condition of the patient is stated to be the state devoid of the presence of the *Ama* in the body.

Table 9.1: Relationship between Dosha dominance in Dhatupaka and duration of morbidity and mortality

Dosha dominance in Dhatupaka	Duration of morbidity or mortality
Vata Pradhanya	7 days
Pitta Pradhanya	10 days
Kapha Pradhanya	12 days
Vata Pitta radhanya	10 days (similar to Pitta)
Vata Kapha Pradhanya	12 days (similar to Kapha)

Dosha prakriti Vaikrityam[1]: The word '*Dosha Prakriti*' refers to the tendency of the Dosha that will vitiate the human body. The word '*Dosha Prakriti Vaikritya*' refers to the reversal of the situation of the *Dosha Prakriti* which has already taken place in the human body i.e. the reversal of the vitiation of the *Dosha* in the human body or restoration of the health.

Jwara Laghuta: The word '*Jwara Laghuta*[2]' refers to the condition wherein the raised body

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G K

[1] When the person is having vitiation of *Vata Dosha* in alimentary canal, he will be presented with constipation. In case of *Doshapaka*, there will be proper evacuation of bowels. When the person is presented with cough with copious amount of sputum, it indicates the vitiation of *Kapha Dosha* in the body. In case of *Doshapaka*, there will be gradual reduction in sputum and disappearance of cough

[2] When we say the term *Jvara Laghuta*, it refers to the subsidence of fever. It involves three major mechanisms
1. **Vasodilatation of skin blood vessels** – it involves intense dilatation of peripheral blood vessels owing to the inhibition of sympathetic centres in the posterior hypothalamus which causes vaso constriction.

temperature comes down and the patient feels lightness of the symptoms of fever. These features suggest the stage of *Ama Pachana*.

Deha Laghuta: refers to the lightness of the body.[3] This is attributable to the detachment of accumulated *Ama* from *Dosha*, *Dhatu* and *Srotas* and the patient feels lightness of the body owing the alleviated symptoms of *Ama*.

Indriyanam Vaimalyam[4]: If the person is suffering from the disease of any kind, this contact of *Indriyartha* etc will be reduced or lost. In *Atisara*, there will be excess *Dravamala Pravritti* from the *Guda* (anus). Here, the *Karmendriya* (*Payu* or anus) function is abnormal. In case of *Kushtha*, the person will be having the features such as *Sparshajnata*. In this instance, there will be abnormal function of *Jnanendriya* (*Sparshanendriya* or touch perception). The term '*Vaimalya* of *Indriyas*' suggest the proper functioning of both *Jnanendriya* and *Karmendriyas* and *Manas*. That means the appropriate knowledge can be gained by the proper contact of *Indriyartha*, *Indriya*, *Manas* and *Atma*. For example, the *Srotrendriya* will be in a position to perceive *Sabda* (auditory perception) appropriately; *Chakshu Indriya* is capable of *Rupa Grahana* (visual perception). *Pani* and *Pada* are in a position to do its Karma i.e. *Grahana* (grasping) and *Gamana* (movement) appropriately without any discomfort or fatigue. There will be proper expulsion of *Mutra* and *Purisha* by respective *Karmendriyas*. The person is capable of proper conversation, a specific function of *Vak Indriya* will be restored when the person attains *Doshapaka* stage.

Dhatupaka: *Dhatupaka* is a status of the body wherein the person will be presented with further progressive pathological changes or worsening of the symptoms.

Nidranasha: loss of sleep[5]. *Nidranasha* is the symptom observed in *Vata Vriddhi* and *Pitta Vriddhi*. As per *Charaka*, less amount of sleep either voluntarily or due to any disease process may be responsible for the increase of *Ruksha Guna* in the body leads to the increase of *Vata Dosha* in the body. (CS – 21/50).

G K

2. **Sweating** – this is secondary to peripheral vasodilatation, which dissipates the excess heat present inside the body.
3. **Decrease in heat production** – reduction in basal metabolism in the tissues and subsidence of shivering and chemical thermogenesis.

[3] Lightness of the body is attributable to the excess fluid loss occurring as a result of dissipation of the heat along with fluid from the body including substances responsible for the manifestation of fever. Along with fluid, even sodium loss from the body can also occur.

[4] Let us take the example of *Guda* (a type of *Karmendriya*). When the person is presented with fever, he will usually suffer from constipation. This is attributable to the activation of sympathetic nervous system. The action of sympathetic nervous system on sphincters is tight closure of the sphincter. This can occur even in anal sphincter too. Thus, the person may suffer from constipation. When the person is recovering from fever, there will be inhibition of sympathetic nervous system, thereby the person may get the relief from constipation.

[5] We all know that there are two types of sleep SWS (Slow wave sleep) and REM (Rapid Eye Movement) sleep. Slow wave usually has a duration of 90 minutes and REM sleep usually has a duration of 5 to 30 minutes. In a young adult, the duration of REM sleep is about 25% of total duration of sleep.
A change in sleep pattern is considered to be due to disturbance in mood and depression.
Another major sleep disturbance that may be of much clinical importance is sleep apnoea syndrome. In this, the person may usually present with day time sleepiness. In this condition, the person may fall asleep while driving, mid-conversation or working. This is attributable to partial upper respiratory tract obstruction.
There is no direct description regarding lack of sleep and metabolic rate. Most of the textbooks of physiology say sleep decreases metabolic rate upto 10-15%. Thus, we can indirectly infer that lack of sleep may increase the metabolic rate. Thus, leading to emaciation of the body.

Table 9.2: Difference between Doshapaka and Dhatupaka

Doshapaka	Dhatupaka Lomaharsha
1. Recovery from the illness	1. Worsening in the symptoms i.e. progression of the illness
2. Disease free symptoms	2. Progression of the symptoms to complications
3. Gradual attainment of strength/ immunity	3. Decrease in strength/ immunity
4. Rasadi Kshaya state will gradually improve	4. Rasadi Dhatu, Mutradi Mala decrease will be observed
5. Restoration of abnormal proportion of Dosha takes place	5. Worsening of the abnormal proportion of Dosha takes place
6. Curable	6. Incurable
7. Helps in longevity of life	7. May lead to untimely death
8. Healing and repair is seen	8. Chronic inflammation is seen

Hridi Stambha[6]: tightness of *Hridaya* region; this may be observed in the people in the patient who is suffering from fever.

Vishtambha[7]: improper or less or loss of motility observed in *Mahasrotas*. i.e. the *Koshtha* will become *Krura*. This is a sign observed in *Vata Prakopa*. This may be due to the imbalance in *Ahara Parinamakara Bhava* – *Ushma* (increase of *Ushna guna*), *Vayu*, *Kleda*, *Sneha* (unctuousness), Kala and *Samayoga*.

Gourava[8]: Heaviness of the body and body parts. This is a sign indicating the increase of *Kapha Dosha* in the part of the body or whole body.

Aruchi: tastelessness[9]. It is a sign of the *Avipaka*. This may be seen in either *Vata Dosha* dominance or *Pitta Dosha* dominance or *Kapha* dominance. It is a sign of imbalance of *Ahara Parinamakara Bhava*.

Arati: restlessness[10]. This is attributable to the worsening of the symptoms in the body.

Balahani: loss of the *Bala*[11]. This can be assessed by the ability to do the exercise by the patient.

G K

[6] In case of the person suffering from fever, as we know there will be activation of sympathetic nervous system. Its effect on heart is development of tachycardia. This phenomenon will lead to the decreased blood supply to the myocardial cells as these cells receive blood supply only during diastolic phase of the heart. Thus, the person likely to suffer from ischemic changes in case of continuous tachycardia. Another phenomenon which may lead to poor cardiac function is hypovolemia.

[7] The term *Vishtambha* refers to poor movement of gastrointestinal tract. As earlier stated, in case of fever, there will be activation of sympathetic nervous system. Its effect on musculature of alimentary canal, two functional changes occur.
1. In gastrointestinal lumen, there will be decreased peristaltic movement and tone of the muscles of gastrointestinal tract
2. Increased tone of sphincters of alimentary canal.
Thus, in case of worsening of the fever, there will be poor gastrointestinal motility, thus the person may suffer from constipation.

[8] The clinical feature mimics the feature of septic shock. This is characterised by hypotension, hypoxia, elevated lactic acid levels, metabolic acidosis and oliguria with urine output less than 30 ml/ hour.

[9] Tastelessness is attributable to the activation of sympathetic nervous system of alimentary canal. There will be reduced secretion of salivary glands during the activation of sympathetic nervous system.

[10] This is attributable to the septicemia and septic shock. The clinical features of septic shock are described in the context of *Gourava* explained in *Dhatupaka* stage.

[11] This can be attributable to the excess fluid and electrolyte loss occurring as a sequel of complication of fever.

Chapter Resources

दोषप्रकृतिवैकृत्यं लघुता ज्वरदेहयोः। इन्द्रियाणां च वैमल्यं दोषाणां पाकलक्षणम्'' Madhu, Ma.Ni. – 2/66-74

''निद्रानाशो हृदि स्तम्भो विष्टम्भो गौरवारुची। अरतिर्बलहानिश्च धातूनां पाक लक्षणम्'' Madhu, Ma.Ni. 2/66-74

मसंश्रयात्''-इति (च.चि.स्था.अ.3)। धातुपाकाद्धन्ति, मलपाकाद्विमुञ्चतीति व्यवस्थितविकल्पः; धातुमलपाकविकल्पे च दैवमेव चहेतुः। उत्तरोत्तररोगवृद्धिबलहानिभ्यां शुक्रादिधातुसहितमूत्रादिना च धातुपाको ज्ञेयः, यदुक्तं,-''निद्रानाशो हृदि स्तम्भो विष्टम्भो गौरवारुचि। अरतिर्बलहानिश्च धातूनां पाक लक्षणम्''-इति; अन्यथा च मलपाकः-''दोषप्रकृतिवैकृत्यं लघुता ज्वरदेहयोः। इन्द्रियाणां च वैमल्यं दोषाणां पाकलक्षणम्''-इति।

Madhu, Ma.Ni. – 2/66-74

ननु, तरतमादिभाव्यव-

- *Madhukosha* commentary, *Madhava Nidana* – 2/66-74
- Textbook of physiology by Guyton and Hall

Key points of the chapter

- Doshapaka and Dhatupaka are the two stages occur in the body when there is presence of abnormal Dosha and Dhatu in the body. Doshapaka is the stage where in restoration of the health is seen and Dhatupaka is the stage where in worsening of the patient's condition is noted.
- Doshapaka is curable and Dhatupaka is incurable in nature.
- Each of the stages can be identified by appropriate clinical features as mentioned in Ayurveda literatures.

Probable questions may be asked in the examination

Short essays

- Explain Doshapaka and Dhatupaka
- Explain in detail Doshapaka
- Explain in detail Dhatupaka

Short answers

- Write the Lakshana observed in Doshapaka
- Write the Lakshana observed in Dhatupaka

MCQs

1. **Dosha Prakriti Vaikriti refers to**
   a. Abnormal Dosha in the body;
   b. Normal Dosha in the body;
   c. Restoration of abnormal Dosha in the body;
   d. None of the above
   Answer -(c)

2. **Deha Laghuta (lightness of the body) is seen in**
   a. Doshapaka;
   b. Dhatupaka;
   c. Both 1 and 2;
   d. None of the above
   Answer -(a)

3. **Hridi Stambha (stiffness of the chest region) is observed in**
   a. Doshapaka;
   b. Dhatupaka;
   c. Both 1 and 2;
   d. None of the above
   Answer -(b)

4. **Doshapaka and Dhatupaka are the stages of the illness seen in the context of**
   a. Rajayakshma;
   b. Udara;
   c. Kshatakshina;
   d. Jvara
   Answer -(d)

5. **The duration of Dosha dominanace in Pitta Pradhana Jvara in Dhatupaka stage is**
   a. 7 days;
   b. 10 days;
   c. 12 days;
   d. 21 days
   Answer -(b)

6. **Which of the following is termed as Malapaka?**
   a. Doshapaka;
   b. Dhatupaka;
   c. Both 1 and 2;
   d. Malapaka term is not mentioned
   Answer -(a)

7. **Which of the following stage is harmful to the body?**
   a. Doshapaka;
   b. Dhatupaka;
   c. Malapaka;
   d. All of the above
   Answer -(b)

8. **In Madhukosha commentary of Madhava Nidana, Doshapaka is mentioned in the context of**
   a. Rajayakshma;
   b. Jvara;
   c. Shvasa;
   d. Kshatakshina
   Answer -(b)

9. **Which of the following regarding Dhatupaka is incorrect?**
   a. Rasa etc Dhatu Kshaya is observed;
   b. Untimely death occur;
   c. Stiffness of the chest region is seen;
   d. Increase of immunity is seen
   Answer -(d)

10. **The cause of Doshapaka and Dhatupaka as per Madhukosha commentary of Madhava Nidana is**
   a. Daiva;
   b. Asatmyendriyartha Samyoga;
   c. Prajnaparadha; All of the above
   Answer -(a)

***

10

Concept of Avarana

Learning objectives

- ⇨ To know the meaning of Avarana
- ⇨ To know the classification of Avarana
- ⇨ To know the pathophysiology occurring in Avarana
- ⇨ Complication of Avarana
- ⇨ To clinically apply the concept of Avarana

आवर्यते देहः चैतन्ययाऽनेन करणे ल्युट्
आच्छादन साधनमात्रे आवरणः। वाचस्पति

- ⇨ The word *Avarana* means to envelop, to mask, to obstruct, to cover or to overlap.
- ⇨ In this type of pathogenesis, basically two types of pathological processes will occur, *Avaraka* and *Avrita* or *Avarya*.
- ⇨ The term *Avaraka* refers to the one which obstructs the passages.
- ⇨ The term *Avrita* or *Avarya* refers to the one which is getting obstructed in the passages.
- ⇨ In this pathological mechanism, *Avaraka* may be visible or invisible, whereas *Avrita* will be always invisible.
- ⇨ The obstructing entity (*Avaraka*) will be always strong enough to mask or obstruct the functions of the entity which is getting obstructed (*Avrita*) by *Avaraka*.

प्रेरकत्वात्। तस्मात् त्रिष्वपि दोषेषु वायुरेवोक्तन्यायेन प्रधानम्, अतः कुपितः पित्तकफौ समुद्धूय ताभ्यामवृतमार्गोऽपि तत्र तत्र प्रदेशे गदान् करोति; तथा रसादींश्च तत्र तत्र क्षिपन् संशोषयेत्॥58-60॥

Ca.Chi. – 28/58-60, Cakra

All the *Dosha* move all over the body through channels. Out of the three *Sharirika Dosha*, *Vata* is having the specific quality i.e. *Sukshma* (minuteness) through which *Vata* enters the minutest channels of the body. Because of this quality, *Vata* is of prime importance. When vitiated, *Vata* can impair the functions of *Pitta* and *Kapha* too and it is responsible for the circulation of the impaired *Doshas* and responsible for the manifestation of the diseases at different parts of the body. This is also responsible for the decrease of *Rasa* etc *Dhatus* in the body due to the Shoshana (dryness).

Characters of Avarana

यस्य यस्य कर्मवृद्धिः स आवरको, यस्य यस्य च कर्महानिः स आवृत इति।
अतः प्रकोपानन्तरं वायुः आवरणं करोतीति संबद्यते।

जेज्जट, च.वि. - 28/216

When pathology of *Avarana* occurs in the body, two mechanisms happen in the body. These are occurring due to the difference in the functions of the abnormal *Dosha*. One *Dosha* is responsible for the enhancement of the function abnormally and another *Dosha* is responsible for the hampering of the function abnormally. The *Dosha* which enhances its functions is *Avaraka* and the one which decreases its functions is *Avrita*. In other words, it is the vitiated *Vata* responsible for the pathology of *Avarana* in the body.

Pathophysiology of Avarana

एषां स्वकर्मणां हानिर्वृद्धिर्वाऽऽवरणे मता। Ca.Ci. – 28/216
अथावृतस्य वायोः कथं कुपितत्वं भवति यावता आवृतो दुर्बल एव भवतीत्याह-वायोरित्यादि।
धातुक्षयादिति सारक्षयात्।

मार्गावरणेन वेगप्रतिबन्धादेव कुपितो भवति।
अथ भवतु मार्गरोधाद्वातकोपः, आवरकेण तु पित्तेन कफेन चास्य कथं न संबन्धो भवतीत्याह-वातपित्तेल्यादि।
त्रितयमेलकेऽपि वायोः प्राधान्यमाह-वायुरेवहि सूक्ष्मत्वादिति; सूक्ष्मार्गानुसारितया प्रेरकत्वात्।
तस्मात् त्रिष्वपि दोषेषु वायुरेवोक्तन्यायेन प्रधानम्,

Ca.Ci. – 28/56-60, Cakra

त्रेन। अनुक्तज्ञानार्थमावरणस्वरूपमाहएषां स्वकर्मणामित्यादि। अत्र आवार्याणां बलीयसाऽऽवरणात् स्वकर्महानिर्भवति, आवरकस्य तूत्सर्गतः स्वकर्मवृद्धिर्भवति, तथा आवरणेन च आवार्यः प्रकुपितो भवति तदा स्वकर्मवृद्धिर्भवति, तथा आवरणेन च आवार्यः प्रकुपितो भवति तदा स्वकर्मणां वृद्धिर्भवतीति व्यवस्था; अन्ये तु आवरणीयस्य स्वकर्महानिः, आवरकस्य तूत्सर्गतो वृद्धिर्भवतीति व्यवस्थामाहुः॥206-216॥ Ca.Ci. – 28/216

- ⇨ Pathological mechanism of *Avarana* is of two folds – *Dhatukshaya* and *Margavarana*. In case of *Dhatukshaya*, there will be *Saara Kshaya* (reduced nutrition to the body). Where as in case of *Margavarana*, there will be obstruction to the flow of the *Vata* in the body.
- ⇨ The person will be developing the gradual symptoms in case of vitiation of *Vata Dosha* due to *Dhatu Kshaya* mechanism of *Avarana*
- ⇨ The person will show sudden symptoms in case of vitiation of *Vata Dosha* due to the mechanism of *Margavarana* of *Avarana*.
- ⇨ Wherever we observe increased and decreased function of *Vata Dosha*, we can infer the ongoing pathological process of *Avarana* inside the body.

Table 10.1: Classification of Avarana

	Amurta	Murta	Paraspara	Total
Caraka	20	11	11	42
Vagbhata	20	12	10	42

Caraka – 42+5 types of *Pittakapha* (*Mishra*) *Avarana* = 47

Anyonya Avarana (Amurta Avarana) 20 Vata by Vata

***Samanya Avarana* (*Murta Avarana*)**: 22 *Vata* by *Pitta*, *Kapha*, *Dhatu*, *Mala* and *Anna*

Table 10.2: Different forms of Avarana

Doshavrita Vata	2
Doshavrita Pancha Vata	10
Dhatvavrita Vata	6
Sarva Dhatvavrita Vata	1
Malavrita Vata	1
Mutravrita Vata	1
Annavrita Vata	Innumerable

Table 10.3: Samanya Avarana

Pittavrita Vata	2Kaphavrita Vata
Raktavrita Vata	Mamsavrita Vata
Asthi Avrita Vata	Majjavrita Vata
Majjavrita Vata	Annavrita Vata
Shukravrita Vata	Mutravrita Vata
Purishavrita Vata	Sarva Dhatvavrita Vata
Pittavrita Prana	Pittavrita Udana
Pittavrita Samana	Pittavrita Vyana
Pittavrita Apana	Kaphavrita Prana
Kaphavrita Udana	Kaphavrita Samana
Kaphavrita Vyana	Kaphavrita Apana

Table 10.4: Anyonya Avarana

Pranavrita Udana	Pranavrita Vyana
Pranavrita Samana	Pranavrita Apana
Udanavrita Prana	Udanavrita Vyana
Udanavrita Samana	Udanavrita Apana
Vyanavrita Prana	Vyanavrita Udana
Vyanavrita Samana	Vyanavrita Apana
Samanavrita Prana	Samanavrita Udana
Samanavrita Vyana	Samanavrita Apana
Apanavrita Prana	Apanavrita Udana
Apanavrita Samana	Apanavrita Vyana

Table 10.5: Clinical features observed during different stages of Avarana and probable line of treatment

Avarana	Lakshana (clinical features)	Treatment
Pittavrita Vata[1]	Daha (burning sensation), Trishna (thirst), Shula (pricking type of pain), Bhrama (giddiness), Tama (darkness in front of the eyes), Vidaha (burning sensation in epigastrium) by consuming Katu, Amla and Lavana Rasa (pungent, sour and salty) substances and Shita Prarthana (affinity towards cold substances)	Shitamushna Kriya (treatment leading to coldness and warmth of the body), consumption of Jivaniya Ghrita, Dhanva Mamsa consumption of Anupa Mamsa), Yava (barley), Shali (rice), Yapana Kshira Basti (enema), Virechana (purgation), Panchamula Siddha Kshira
Kapha-vrita Vata[2]	Shaitya (coldness), Gaurava (heaviness), Shula (pricking type of pain), Katvadi Upashaya (getting comfort after consuming Katu etc substances) Langhanayasa (getting comfort after performing fasting and exertion) Ushnakamitva (affinity towards hot substances)	Svedana (fomentation), Niruha (a type of enema), Vamana (emesis), Virechana (purgation), Tila (sesamum seeds), Purana Ghrita (ghee kept for long duration), Sarshapa (mustard seeds)
Raktavrita Vata[3]	Daha (burning sensation), Arti (pain), pain in between Mamsa and Tvak, Saraga (redness) and Shvayathu (swelling)	Vatarakta line of treatment
Mamsa-vrita Vata	Kathina (hard swelling), Vivarna (discolouration), Pidaka (boils) and Shvayathu (swelling), Harsha (horripulation) and Pipilika Iva Sanchara (sensation of movement of ants all over the body	Sveda (fomentation), Abhyanga (massage), Rasa (consumption of Mamsarasa), Kshira (consumption of milk), Sneha (consumption of oil or ghee etc)
Medasa-vrita Vata	Chala (unstable swelling), Snigdha (unctuousness), Mridu (soft swelling), Shita (cold in touch), Shophanga (swelling of body parts), Aruchi (tastelessness)	Medohara Chikitsa (line of treatment of hyperlipidemia) and Prameha Chikitsa (line of treatment of excess passage of urine)
Asthi Avrita Vata	Feeling comfortable while pressing and hot touch, Pidana and pricking type of pain	Maha Sneha
Majja-vrita Vata	Vinama (forward bending), Jrimbhana (excessive yawning), Pariveshtana (sensation of covering of all over the body), Shula (pricking type of pain), feeling comfortable while pressing	Maha Sneha
Shukravrita Vaga	Avega (absence of ejaculation) and Ativega (premature ejaculation) and Nisphalatva (absence of progeny)	Maha Sneha (consumption of Mahasneha)
Annavrita Vata	Shula (pricking type of pain) after the consumption of food and during Jirna Avastha	Ullekhana (emesis), Pachana (digestion of food), Dipana (increasing the appetite) and Laghu Ahara (consumption of food which is light to digest)
Mutravrita Vata	Apravritti (reduced frequency of micturition) and Ati Adhmana (swelling observed in the supra pubic region)	Svedana (fomentation therapy), Uttara Basti (administration of medicine through urethral or vaginal route)
Vid Avrita Vata	Vibandha (constipation), Parikrintati (discomfort), Anaha (distension of the abdomen), Shushka (hard stools), Dukha (discomfort while passing stools), Chirat Pidita (passage of stools with much dealy) while defaecation, pain in Shroni (pelvis), Vankshana (groin) and Prishtha (back), discomfort in Hridaya	Eranda Taila, Snigdha and Udavarta Chikitsa (for example, consumption of Eranda Taila or castor oil which is having unctuous quality and is also useful in Udavarta)
Pranavrita Vyana[4]	Sarvendriya Shunyatva (loss of functions of all Indriya), Smriti Kshaya (loss of memory), Bala Kshaya (loss of strength)	Urdhvajatrugata Karma (treatment of Jatrurdhva Vikara)
Vyanavrita Prana	Atyartham Sveda (excessive sweating), Lomaharsha (horripulation), Tvag Dosha (skin disease), Suptagatrata (numbness of the body parts)	Snehayukta Virechana (purgation therapy by Eranda Taila etc)
Pranavrita Samana	Jada (laziness), Gadgada (stuttering), Mukatva (dumbness)	Chatushprayoga Sneha (consumption of Sneha) and Yapana Basti (enema)
Samanavrita Apana	Grahani (chronic disease of alimentary canal where frequent unformed and formed stools is seen), Parshvagada (discomfort in sides of the chest) and Hrid Gada (heart disease)	Dipana Ghrita (consumption of Dipana Ghrita which helps in increase of appetite)
Pranavrita Udana	Shirograha (tightness of the head), Pratishyaya (running nose), Nishvasa and Ucchvasa Sangraha (difficulty in inspiration and expiration), Hridroga (heart disease) and Mukhashosha (dryness of mouth)	Urdhvajatrugata Karma (Kriyakalpa and other treatments of Jatrurdhva Vikara) and Ashvasana (counselling)
Udanavrita Prana	Karma Nasha (loss of physical activities), Ojo Nasha (loss of Ojas), Bala Nasha (loss of strength) and Varna Nasha (loss of complexion) and Mrityu (death)	Shitavarina Sinchana (sprinkling cold water) and Ashvasana (counselling)
Udanavrita Apana	Chardi (vomiting) and Shvasa (breathlessness) etc	Basti (enema) and Anulomana (medicine which helps in proper expulsion of contents of large intestine through anal route)

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1 In *Pittavrita Vata*, the functions of *Pitta* which is *Avaraka* are increased and the functions of *Vata* are decreased in the diseased individual. Among the *Lakshana*, *Shula* is said to be occurring due to the dominance of *Pitta Dosha* which encircles or covers or obstructs the *Vata Dosha* resulting in hampered function of *Vata Dosha*. In this situation, *Vata* is said to be *Avrita*. The treatment helps in the decrease of *Pitta* thereby we can facilitate the movement of obstructed *Vata*.

2 In case of *Kaphavrita Vata*, the *Vata* is being obstructed by *Kapha*. That means in this occasion, *Kapha* becomes the *Avaraka* and *Vata* becomes *Avrita*. In this condition too, Shula (pricking type of pain) is said to be occurring due to the *Vata* and rest of the other symptoms are implying the increase of *Kapha Dosha* in the body. The treatment in this situation helps in the pacification of *Kapha Dosha*, thereby facilitates the movement of obstructed *Vata*.

3 In *Raktavrita Vata*, clinical features manifest due to the abnormality in *Rakta* and *Vata* as *Avaraka* and *Avrita* respectively. In this situation, abnormality in *Rakta* shows the increased function and abnormality in *Vata* shows the decreased function. That means to say *Rakta* is *Avaraka* and *Vata* will be the *Avrita*. Here, *Daha*, *Saragatva* and *Shvayathu* in between *Tvak* and *Mamsa* are indicating the increase of *Avaraka* and presence of *Arti* implies the *Avrita* in the body.
Likewise, in case of *Dhatu Avarana*, *Vata* will always be *Avrita* and different *Dhatu* leading to the abnormal functions of the body will be *Avaraka*.

4 In *Pranavrita Apana*, *Pranavata* becomes *Avaraka* and *Vyanavata* becomes the *Avrita*. This is understood by the clinical features such as loss of memory and loss of strength which is considered to be reduced function of *Avrita*.

Avarana	Lakshana (clinical features)	Treatment
Apanavrita Udana	Moha (confusion), Alpagni (loss of appetite) and Atisara (diarrhoea)	Vamana (emesis), Dipana (measures to increase appetite) and Grahi Ashana (measures to retain the fluid from contents of large intestine)
Vyanavrita Apana	Chardi (vomiting), Adhmana (distension of abdomen), Udavarta (a condition where reverse movement of Apana Vata is seen), Gulma (chronic abdominal swelling), Arti (discomfort in the abdomen), Parikartika (bleeding per rectum)	Snigdha Anulomana (for example, consumption of Eranda Taila on empty stomach)
Apanavrita Vyana	Vit Mutra Retas Atipravritti (excess passage of faecal matter, urine and semen)	Sangrahana (measures to conserve these biomaterials)
Samanavrita Vyana	Murcha (altered consciousness), Tandra (drousiness), Pralapa (irrelevant speech), Angasada (sluggish activities of body parts), Agnikshaya (loss of appetite), Ojokshaya (loss of Ojas from the body), Balakshaya (loss of strength)	Vyayama (exercise) and Laghu Bhojana (consumption of food which is light to digest)
Udanavrita Vyana	Stabdhata (stiffness), Alpagnita (loss of appetite), Asveda (absence of sweating), Cheshtahani (reduced or absent physical activities), Nimilana (closure of eyelids)	Pathya, Mita and Laghu Ahara (consumption of wholesome diet, calculated amount of food and consumption of food which is light to digest)
Pittavrita Prana	Murcha (altered consciousness), Daha (burning sensation), Bhrama (giddiness), Shula (pricking type of pain), Vidaha (burning sensation in chest), Shitakamitva (affinity towards cold substances), Vidagdhasya Chardana (vomiting of improperly digested food)	
Kaphavrita Prana	Shtivana (sputum), Kshavathu (sneezing), Udgara (belching), Nishvasa and Ucchvasa Sangraha (breathing discomfort), Aruchi (tastelessness) and Chardi (vomiting)	
Pittavrita Udana	Murcha (altered consciousness), Nabhyurasah Daha (burning sensation of umbilical region and chest), Klama (fatigue without physical exertion), Ojobhramsha (loss of Ojas from the body), Sada (sluggish activities)	
Kaphavrita Udana	Vaivarnya (discolouration), Vak Svaragraha (inability to speak), Daurbalya (weakness), Gurugatratva (heaviness of the body parts), Aruchi (tastelessness)	
Pittavrita Samana	Atisveda (excessive sweating), Trisha (thirst), Daha (burning sensation), Murcha (altered consciousness), Aruchi (tastelessness), Ushmanah Upaghata (loss of appetite)	
Kaphavrita Samana	Asveda (absence of sweating), Agnimandya (loss of appetite), Lomaharsha (horripulation), Gatranam Chati Shitata (sensation of excess coldness all over the body)	

Avarana	Lakshana (clinical features)	Treatment
Pittavrita Vyana	Sarvanga Daha (burning sensation all over the body), Klama (fatigue without any physical exertion), Gatravikshepa (involuntary movements all over the body), Sanga (reduced movement), Sasantapa (burning sensation), Savedana (pain in different parts of the body)	
Kaphavrita Vyana	Sarva Gatranam Guruta (heaviness of all parts of the body), Sarva Sandhi and Asthi ruja (pain in all joints and bones), Gati Sanga (reduced movement) and Adhika Gati (excess movement)	
Pittavrita Apana	Haridra Mutra and Varchas (yellowish coloured urine and faecal matter), Gudatapa (burning sensation in anal region) and Medhratapa (burning sensation in penis), Rajasah Ativartana (excess menstruation)	
Kaphavrita Apana	Bhinna (unformed stools) Ama (stool which sinks in water) Shleshma (mucus mixed stool) Samsrishta (stools showing Vata/Pitta/Kapha Dosha dominance), Guru Varcha Pravartana (stools which are having Guru quality), Kaphaja Prameha (feature of Kaphaja Prameha)	

Clinical types of Avarana

1. *Avarana* of *Sama Vata* by *Vriddha Dosha* or *Dushya*
2. *Avarana* of *Vriddha Vata* by *Sama Dosha* or *Dushya*
3. *Avarana* of *Vriddha Vata* by *Vriddha Dosha* or *Dushya*

Diagnosis of Avarana

Diagnosis of *Avarana* can be done by differentiating with *Kshaya, Vriddhi, Gatavata* with profound knowledge of *Lakshana*. It is done by exclusion and reasoning.

Exclusion by Nidana:

- *Madhumeha* – due to *Avarana* (Ca.Su. – 17/78-79)
- Madhumeha – Kevala Vatajanya (Ca.Ni. – 4/36)
- Though the disease is of Vata there is No causative factor of vitiation of Vata or *Dhatu Kshaya*
- History of indulgence of etiological factors of *Avaraka* can be appreciable.

Exclusion by Lakshana

- In *Kevalavatajanya Madhumeha, Mutra* is *Kashaya* and *Madhura Rasa* and *Pandu* in colour
- In *Avaranajanya Madhumeha, Dhatu Kshaya Lakshana* are absent in initial stage of *Prameha* (Ca.Su. – 17/81)

Exclusion by Upashaya

- The condition of *Avarana* will not respond to *Upashaya* of *Vata* rather he feels *Sukha* with *Upashaya* of *Avaraka*.
- In *Pittavrita Vata, Upashaya* is *Shita* (exposure to cold) but not *Ushna* (exposure to heat).
- In *Kaphavrita Vata, Upashaya* is *Katu* etc and feels comfort on exposure to lightning activities and exertional activities. (Ca.Ci. – 28/61-63)

Complications of Avarana

हृद्रोगो विद्रधिः प्लीहागुल्मोऽतीसार एव च॥236॥
भवन्त्युपद्रवास्तेषामावृतानामुपेक्षणात्। Ca.Ci. – 28/236

If proper management of *Avarana* is not being followed, then that will lead to the manifestation of

- ⇨ *Hridroga*[5]
- ⇨ *Vidradhi*[6]
- ⇨ *Pliha*[7]
- ⇨ *Gulma*[8]
- ⇨ *Atisara*[9]

Chapter Resources

1. Madhukosha commentary, Madhava Nidana – 2/66-74
2. Textbook of physiology by Guyton and Hall

Key points of the chapter

- ⇨ Doshapaka and Dhatupaka are the two stages occur in the body when there is presence of abnormal Dosha and Dhatu in the body. Doshapaka is the stage where in restoration of the health is seen and Dhatupaka is the stage where in worsening of the patient's condition is noted.
- ⇨ Doshapaka is curable and Dhatupaka is incurable in nature.
- ⇨ Each of the stages can be identified by appropriate clinical features as mentioned in Ayurveda literatures.

Probable questions may be asked in the examination

Short essays

- ⇨ Explain Doshapaka and Dhatupaka
- ⇨ Explain in detail Doshapaka
- ⇨ Explain in detail Dhatupaka

Short answers

- ⇨ Write the Lakshana observed in Doshapaka
- ⇨ Write the Lakshana observed in Dhatupaka

MCQs

1. **Dosha Prakriti Vaikriti refers to**
   a. Abnormal Dosha in the body;
   b. Normal Dosha in the body;
   c. Restoration of abnormal Dosha in the body;
   d. None of the above
   Answer -(c)

G K
[5] When the coronary vessels are having the blockage in the form of arteriosclerosis, he will be getting the clinical presentation of acute coronary syndrome
[6] When the thrombus is infected with microorganisms, that may lead to the formation of abscess formation.
[7] Thrombus formation in the hepatic vein and portal vein leads to the mechanism of portal hypertension. This is responsible for splenomegaly.
[8] When thrombus formation occurs in mesenteric veins, there is the possibility of chronic intestinal obstruction.
[9] When there is atherosclerotic changes present in the superior mesenteric artery, there will be ischemic changes observed in large intestine, resulting in the presenting complaint of diarrhoea.

2. **Deha Laghuta (lightness of the body) is seen in**
   a. Doshapaka;
   b. Dhatupaka;
   c. Both 1 and 2;
   d. None of the above
   Answer -(a)
3. **Hridi Stambha (stiffness of the chest region) is observed in**
   a. Doshapaka;
   b. Dhatupaka;
   c. Both 1 and 2;
   d. None of the above
   Answer -(b)
4. **Doshapaka and Dhatupaka are the stages of the illness seen in the context of**
   a. Rajayakshma;
   b. Udara;
   c. Kshatakshina;
   d. Jvara
   Answer -(d)
5. **The duration of Dosha dominanace in Pitta Pradhana Jvara in Dhatupaka stage is**
   a. 7 days;
   b. 10 days;
   c. 12 days;
   d. 21 days
   Answer -(b)
6. **Which of the following is termed as Malapaka?**
   a. Doshapaka;
   b. Dhatupaka;
   c. Both 1 and 2;
   d. Malapaka term is not mentioned
   Answer -(a)
7. **Which of the following stage is harmful to the body?**
   a. alapaka;
   d. All of the above
   Answer -(b)
8. **In Madhukosha commentary of Madhava Nidana, Doshapaka is mentioned in the context of**
   a. Rajayakshma;
   b. Jvara;
   c. Shvasa;
   d. Kshatakshina
   Answer -(b)
9. **Which of the following regarding Dhatupaka is incorrect?**
   a. Rasa etc Dhatu Kshaya is observed;
   b. Untimely death occur;
   c. Stiffness of the chest region is seen;
   d. Increase of immunity is seen
   Answer -(d)
10. **The cause of Doshapaka and Dhatupaka as per Madhukosha commentary of Madhava Nidana is**
    a. Daiva;
    b. Asatmyendriyartha Samyoga;
    c. Prajnaparadha; All of the above
    Answer -(a)

***

11

Dosha Gati and Rogamarga

Learning objectives

- ⇨ The knowledge of Doshagati helps in the site of Dosha Prakopa along with its movement inside the body
- ⇨ Helpful in the status of the disease in the individual
- ⇨ Helpful in deciding the actual status of the patient and assessing the different proportions of the Dosha in the body
- ⇨ Helpful in assessing the Sadhyasadhyata of the disease
- ⇨ Helpful in deciding the appropriate management

Introduction

The term *Gati* is used in different meanings. In one context, *Gati* is the main function of *Vata Dosha*. It is being depicted by the derivation of *Vata Dosha* i.e. '*Va Gati Gandhanayoh*'. Su.Su. – 21/5. Here, *Gati* refers to the motor activity and *Gandhana* refers to the sensory activity. Among the *Guna* of *Vata Dosha*, *Chala Guna* is responsible for this kind of activity.

In another context, Gati is explained as follows

गतिः प्रकारोऽवस्था वा। चक्र; च.सू. 17/117

The term *Gati* refers to the different type of *Dosha* or different stage of the status of *Dosha*. The term '*Prakara*' refers to the status of *Dosha* whether it is in the increased state or decreased state or normal state; or whether the *Dosha* is situated in particular part of the body or whole body. The term '*Avastha*' refers to the state of *Dosha* in the healthy or diseased state of the body. The information regarding the *Doshagati* will be helpful in the assessment of *Samprapti* as well as deciding the prognosis of the disease and is useful in planning the treatment. For example, in the patient who is having the complaint of vomiting, we can say that there is *Urdhwa Pravritti* of *Dosha*; if the person is suffering from diarrhoea, we can say that *Adho Pravritti* of *Dosha* and if the person is developing skin rashes all over the body then we can say that there is *Tiryak gati* of *Dosha* in that patient. The above description of status of *Dosha* is indicating the movement of *Dosha* in different part of the body. Thus, this information helps in deciding the severity of the vitiation of the *Dosha*, degree of vitiation of *Dhatu* and *Mala* etc.

Charaka has described the Doshagati based on three different parameters. They are

1. **Based on *Lakshana*:** *Kshaya*, *Sthana* and *Vriddhi Lakshana*
2. **Based on movement of *Doshas* inside the body:** *Urdhwa*, *Adha* and *Tiryak*
3. **Based on affliction of site/s of the body:** *Koshtha*, *Shakha* and *Marmasthisandhi*
4. **Based on seasonal variations of *Dosha*:** *Chaya*, *Prakopa* and *Prashama*

1. Based on *Lakshana*:

The wise clinician has to observe thoroughly by proper history and complete clinical examination, which *Doshas* are increased in the body? Whether one *Guna* (quality) or two or more *Gunas* (qualities) are involved in the pathogenesis? Is there local or generalised involvement? What about the proportion of the *Vriddha* (increased state), *Kshina* (decreased state) and *Sthana Lakshana* (normal status) of the *Doshas*?

In *Ashtanga Hridaya*, *Prakrita Karma* and *Vriddhi* and *Kshaya Lakshana* of *Dosha* are explained. Now we will discuss in detail.

Prakrita Lakshana of Dosha

Normal functioning of Vata Dosha

उत्साहोच्छ्वासनिःश्वासचेष्टावेगप्रवर्तनैः।
सम्यग्गत्या च धातूनामक्षाणां पाटवेन च॥
अनुगृह्णात्यविकृतः अ.हृ.सू.- 11/1-2

Vata Dosha is having normal physiological functions such as *Utsaha* (enthusiasm), *Ucchvasa* (expiration), *Nishvasa* (inspiration), *Cheshta* (various physical, mental and vocal activities), *Vega Pravartana* (expulsion of natural urges), *Dhatunam Samyak Gati* (proper movement of *Dhatu*), *Akshanam Patava* (proper functioning of *Indriyas*).

Normal functioning of Pitta Dosha

.... पित्तं पक्त्यूष्मदर्शनैः।
क्षुत्तृड्रुचिप्रभामेधाधीशौर्यतनुमार्दवः॥ अ.हृ.सू.-11/2.3

Pitta Dosha is having normal physiological functions such as *Pakti* (proper digestion), *Ushma* (generation of heat), *Darshana* (proper vision), *Kshut* (proper development of appetite), *Trishna* (proper occurrence of thirst), *Ruchi* (proper taste perception), *Prabha* (proper lustre), *Medha* (intellect), *Dhi* (decision making ability), *Shourya* (courage), *Tanu Mardava* (softness of body parts).

Normal functioning of Kapha Dosha

श्लेष्मास्थिरत्वस्निग्धत्वसन्धिबन्धक्षमादिभिः। अ.हृ.सू.-11/3

Kapha Dosha is having normal physiological functions such as *Sthiratva* (firmness to the body parts), *Snigdhatva* (unctuousness to the body parts), *Sandhibandha* (proper compactness of the joints), *Kshama* (tolerating capacity).

Vriddha Lakshana of Dosha

Vriddha Lakshana of Vata Dosha

..............वृद्धस्तु कुरुतेऽनिलः।
कार्श्यकार्ष्ण्योष्णकामित्वकम्पानाहशकृद्ग्रहान्।
बलनिद्रेन्द्रियभ्रंश प्रलापभ्रमदीनताः॥ अ.हृ.सू.-11/5.6

Increased state of *Vata Dosha* is presented with the features such as *Karshya* (emaciation), *Karshnya* (blackish discolouration), *Ushna Kamitva* (affinity to consume hot or warm substances), *Kampa* (involuntary movements), *Anaha* (distension of the abdomen), *Shakrit Graha* (constipation), *Bala Bhramsha* (loss of strength), *Nidra Bhramsha* (loss of sleep), *Indriya Bhramsha* (loss of functions of *Indriya* both *Jnanendriya* or sense organs and *Karmendriya* or organs of action), *Pralapa* (irrelevant speech), *Bhrama* (giddiness) and *Dinata* (ill look).

Vriddha Lakshana of Pitta Dosha

पीतविण्मूत्रनेत्रत्वक् क्षुत्तृड्दाहाल्पनिद्रताः। अ.हृ.सू.-11/7

Increased state of *Pitta Dosha* is presented with the features such as *Pita Vit* (yellowish discolouration of faecal matter), *Pita Mutra* (yellowish discolouration of urine), *Pita Netra* (yellowish discolouration of eyes), *Pita Tvak* (yellowish discolouration of skin), *Kshut* (excessive appetite), *Trishna* (excessive thirst), *Daha* (burning sensation) and *Alpanidrata* (less sleep).

Vriddha Lakshana of Kapha Dosha

........श्लेष्माग्निसदनप्रसेकालस्यगौरवम्।
श्वैत्यशैत्यश्लथाङ्गत्वं श्वासकासातिनिद्रताः॥ अ.हृ.सू.11/7.8

Increased state of *Kapha Dosha* is presented with *Agnisadana* (lack of appetite), *Praseka* (excess salivation), *Alasya* (laziness), *Gourava* (heaviness of the body parts), *Shvaitya* (whitish discolouration), *Shaitya* (excess cold sensation), *Shlathangatva* (looseness of the body parts), *Shvasa* (breathing discomfort), *Kasa* (cough), *Atinidrata* (excess sleep).

Kshaya Lakshana of Dosha

Kshaya Lakshana of Vata Dosha

लिङ्गं क्षीणेऽनिलेऽङ्गस्य सादोऽल्पं भाषितेहितम्।
संज्ञामोहस्तथा श्लेष्मवृद्ध्युक्तामय संभवः॥ अ.हृ.स.-11/15

Decreased state of *Vata Dosha* is presented with *Angasada* (sluggish movement of the body parts), *Alpa Bhashita* (less speech), *Alpa Ihita* (less physical activities), *Sanjna moha* (confusion), *Shleshma Vriddhyukta Amaya* (disorders which indicate the increase of *Kapha Dosha* in the body such as breathing discomfort or excess salivation etc).

Kshaya Lakshana of Pitta Dosha

पित्ते मन्दोऽनलः शीतं प्रभाहानिः.........। अ.ह.सू.- 11-16

Decreased state of *Pitta Dosha* is presented with *Manda Anala* (decreased digestive fire), *Prabhahani* (loss of lustre).

Kshaya Lakshana of Kapha Dosha

.................................कफे भ्रमः।
श्लेष्माशयानां शून्यत्वं हृद्द्रवत्वः श्लथसन्धिता॥

अ.ह.स.-11/16

Decreased state of *Kapha Dosha* is presented with *Bhrama* (giddiness), *Shleshmashayanam Shunyatva* (emptiness of the organs where *Kapha* will be abundant such as *Amashaya* etc), *Hrid Drava* (palpitation), *Shlathasandhita* (loosenss of the joints).

- For example, *Karshya* (emaciation), *Karshnya* (blackish discolouration), *Kampa* (involuntary movements), *Anaha* (distension of the abdomen) etc imply the enhancement of *Vata Dosha* in the body. This may indicate the increase of *Laghu* quality in the context of *Karshya*, increase of *Chala* quality in the context of *Kampa*, increase of *Ruksha* quality in the context of *Anaha*.
- Presence of *Angasada* (sluggish movement of body parts), *Alpa bhashita* (less speech), *Alpa Ihita* (less physical activity) etc indicate the depletion of *Vata Dosha* in the body. In these situations, there will be decrease of *Ruksha* quality (simultaneous increase of *Snigdha* quality) in case of less physical acitivity, *Angasada*.
- *Lakshana* such as *Karshya* (emaciation), *Dinata* (ill look) indicate the generalised involvement and *Lakshana* such as *Shakrit Graha* (constipation), *Indriya Bhramsha* (poor functioning of sense organs) indicate the localised involvement in case of abnormal functions of *Vata Dosha*.
- If the person is presented with the complaints of *Cheshtahani* (reduced or loss of strength) in upper and lower limb of either right or left side of the body implies the *Indriya Bhramsha*, *Karmendriya* (organs of action) in particular, which is a clear indication of *Vata Vriddhi*.
- For example, *Karshya* (emaciation), *Karshnya* (blackish discolouration), *Kampa* (involuntary movements), *Anaha* (distension of the abdomen) etc imply the enhancement of *Vata Dosha* in the body
- Presence of *Angasada* (sluggish movement of body parts), *Alpa bhashita* (less speech), *Alpa Ihita* (less physical activity) etc indicate the depletion of *Vata Dosha* in the body.
- *Lakshana* such as *Karshya* (emaciation), *Dinata* (ill look) indicate the generalised involvement and *Lakshana* such as *Shakrit Graha* (constipation), *Indriya Bhramsha* (poor functioning of sense organs) indicate the localised involvement in case of abnormal functions of *Vata Dosha*.
- If the person is presented with the complaints of *Cheshtahani* (reduced or loss of strength) in upper and lower limb of either right or left side of the body implies the *Indriya Bhramsha*, *Karmendriya* (organs of action) in particular, which is a clear indication of *Vata Vriddhi*.

2. **Based on movement of Doshas inside the body:**

Analysis of this parameter is again made out through proper history and thorough clinical examination. We know that in case of *Nija Vikara* (where *Dosha* vitiation is the prime reason for the causation of disease), production and aggrevation of the *Dosha* takes place in the *Mahasrotas* (alimentary canal). When there is vitiation of *Dosha* is much more progressive, that will move in different directions of the body depending upon the weak functioning of *Srotas*.

- For example, if one observes the *Lakshana* such as *Hrid drava* (palpitation), *Daha* (burning sensation in chest), *Chardi* (vomiting) etc, one may say that the person is having *Urdhwagati* of *Doshas* (upward movement of *Dosha*).
- Similarly, if the person is complaining of *Vibandha* (constipation) or *Atisara* (diarrhoea) or *Raktapravritti* through *Guda* (excess bleeding per rectum) may suggest the *Adhogati* of *Doshas* (downward movement of *Dosha*).
- If the person attains the *Visphota* (blisters) all over the body following medications or suppression of vomiting may suggest the *Tiryak gati* of *Doshas* (oblique movement of *Dosha*).
- In case of *Raktapitta, Urdhwagati, Adhogati* and *Tiryak gati* can be easily explained. Presence of *Raktapravritti* (bleeding) through nose, mouth, ears eyes suggest the *Urdhwa gati* of *Doshas* suggestive of *Urdhwaga Raktapitta.* Presence of *Raktapravritti* (bleeding) through anus, urethra or vagina may suggest the *Adha gati* of *Doshas* implies *Adhoga Raktapitta*. Presence of *Raktapravritti* in the skin may indicate the *Tiryak gati* of *Doshas*.

3. **Based on afflictions of the site/s of the body:**

This can also be predicted by thorough history and physical examination. This is dealt in detail in further pages in the context of *Rogamarga*.

- For example, if one observes the features such as fullness of the abdomen or bloating sensation; nausea or *Praseka* (excess salivation) or *Vibandha* (constipation), *Atisara* (diarrhoea) one can infer *Koshtha* (*Abhyantara Rogamarga*) as the involved *Rogamarga* in this instance.
- Presence of *Sandhisula* (pain in the joints), *Sandhisopha* (swelling of the joints), *Hrit Sula* (chest discomfort), *Basti toda* (pricking type of pain in the lower abdomen), *Sirasula* (pricking type of pain) may suggest the *Madhyama Rogamarga* involvement.
- If the person presents with the complaints of *Shithilendriya* (poor functioning of *Indriya*), *Srama* (fatigue after exercise), *Klama* (fatigue without any exercise), *Kushtha* (skin disease) etc, one may infer the involvement of *Shakha* (*Bahya*) *Rogamarga*.

4. **Based on seasonal variations of Dosha: Chaya, Prakopa and Prashama**

चयप्रकोपप्रशमाः वायोर्ग्रीष्मादिषु त्रिषु।
वर्षादिषु तु पित्तस्य श्लेष्मणः शिशिरादिषु॥

अ.ह.सू.- 12/24-25

Depending upon the variations observed in different seasons in a year, the degree of variations will differ. The seasons will show the accumulation, provocation of *Dosha* and subsidence of *Dosha*. This is depicted in the tabular pattern below.

Table 11.1: Relation between different stages of Dosha vitiation and different seasons

Dosha	Sanchaya (season of accumulation)	Prakopa (season of provocation)	Prashama (season of subsidence)
Vata	Grishma Ritu	Varsha Ritu	Sharat Ritu
Pitta	Varsha Ritu	Sharat Ritu	Hemanta Ritu
Kapha	Shishira Ritu	Vasanta Ritu	Grishma Ritu

Reasons for the movement of Dosha from Koshtha to Shakha

व्यायामादूष्मणस्तैक्ष्ण्याद्धितस्यानवचारणात्।
कोष्ठाच्छाखा मला यान्ति द्रुतत्वान्मारुतस्य च॥3 1॥
तत्रस्थाश्च विलम्बन्ते कदाचिन्न समीरिताः।
नादेशकाले कुप्यन्ति भूयो हेतुप्रतीक्षिणः॥3 2॥

Ca.Su. – 28/31-32

- *Vyayama* – excess amount of exercise
- *Ushmanah Taikshnya* – increase of *Tikshna Guna* of *Ushma* or *Agni*
- *Ahita Acharanat* – following unwholesome diet and regimen, this is occurring in two different ways, either consumption of

Ahita Ahara (unwholesome diet in excess) or consumption of *Hita* (wholesome diet or regimen) substances in excess

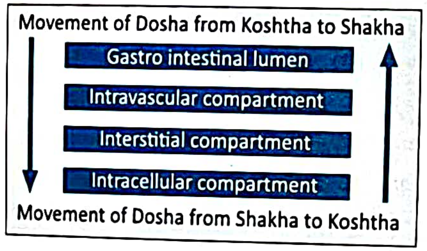
- ⇨ *Marutasya Drutatva* – excess or rapid movement of *Vata Dosha*

By above reasons, the *Dosha* will move from *Koshtha* (alimentary canal) to *Shakha* (periphery). The displaced *Dosha* will remain dormant without producing any disturbances unless conducive environment is attained by the displaced *Dosha*.

Reasons for the movement of Dosha from Shakha to Koshtha

वृद्ध्या विष्यन्दनात् पाकात् स्रोतोमुखविशोधनात्।
शाखा भुक्त्वा मलाः कोष्ठं यान्ति वायोश्च निग्रहात्॥
Ca.Su. – 28/33

Chart 11.1: Schematic representation of movement of Dosha from Koshtha to Shakha and vice versa


Movement of Dosha from Koshtha to Shakha
Gastro intestinal lumen
Intravascular compartment
Interstitial compartment
Intracellular compartment
Movement of Dosha from Shakha to Koshtha

- ⇨ *Dosha Vriddhi* – vitiation or exacerbation of *Dosha* in the body
- ⇨ *Vishyandana* – *liquefication* of the etiological factors
- ⇨ *Paka* – *Dosha Paka* or suppuration
- ⇨ *Srotomukha Vishodhana* – cleansing of the *Srotas*
- ⇨ *Vayoh Nigraha* – suppressing the movement of *Vata Dosha*

Whenever, there is a etiological factor exposure in the alimentary canal, it increases in the alimentary canal. Either it should go in the upward direction in the form of vomiting or in the downward direction in the formation of diarrhoea or it should get absorbed into the intravascular compartment. This absorption of pathogens into the intravascular compartment can be attributable to simple concept of diffusion.

From the intrascular compartment, the pathogens move from higher concentration to lower concentration into interstitial compartment and thence into intravascular compartment. Thus, we can apply the movement of vitiated *Dosha* from *Koshtha* to *Shakha*.

When, we start avoiding the etiological factors, exactly the reverse mechanism starts to manifest. Initially, there will be less pathogens in the alimentary canal and there will be higher concentration in the intravascular compartment. Thus, there will be movement of pathogens from intravascular compartment into alimentary canal.

Due to the less pathogens in the intravascular compartment, due to simple diffusion process, the pathogens present in interstitial compartment start to move into intravascular compartment. This mechanism results in the increased concentration of pathogens in the intracellular compartment which leads to the movement of pathogens from intracellular compartment into interstitial compartment by simple diffusion process. This whole explanation gives us the probable appropriate explanation for the movement of *Dosha* from *Shakha* to *Koshtha*.

Rogamarga

Image of human outline is taken from Doc Formats.com, in this there are three images which depict the concept of *Rogamarga*, the first image is related to *Bahya Rogamarga* and middle image is showing *Madhyama Rogamarga* and image of extreme right side indicates *Abhyantara Rogamarga*.

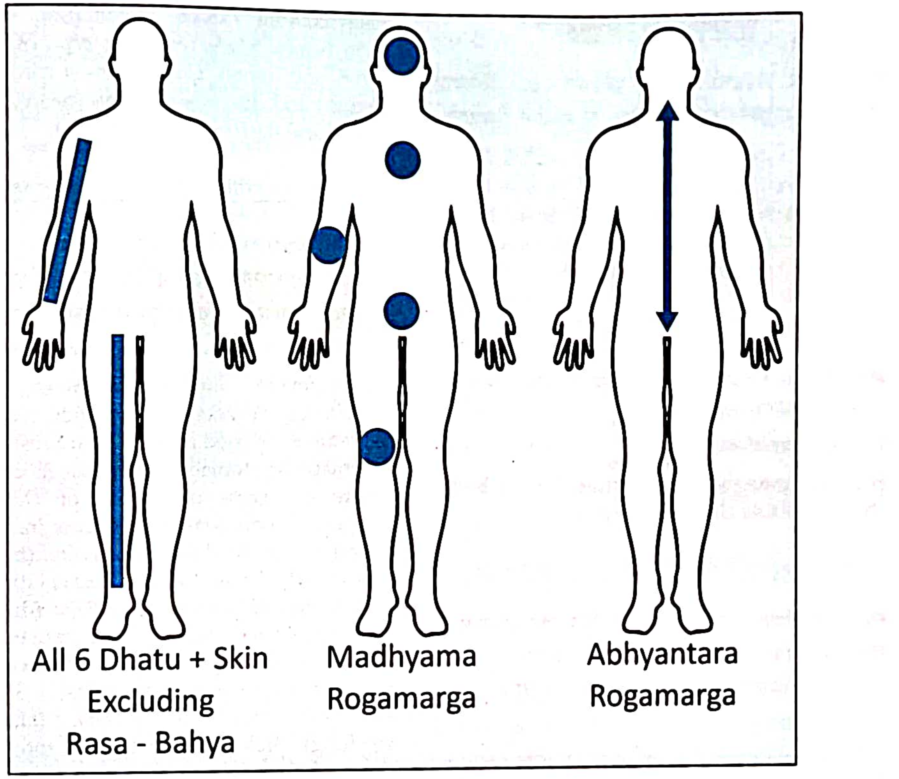


Fig 11.1: Images depicting concept of Rogamarga: Bahya, Madhyama and Abhyantara

Introduction

Movements of normal *Dosha* and abnormally vitiated *Dosha* occurs in different parts or channels of the body continuously. Due to vitiation of *Dosha*, presence of *Khavaigunya* and *Dhatu Dushti*, the circulating *Dosha* all over the body finally settle in one particular place or multiple places and mingle with *Dhatu*, thereby responsible for the manifestation of the disease. For the proper understanding of the disease and for proper planning of the treatment, these different abodes of settlement of vitiated *Dosha* are categorised into 3 divisions.

त्रयो रोगमार्गा इति - शाखा मर्मास्थिसन्धयः, कोष्ठश्च।
च.सू. - 11/48

1. *Shakha* (external pathway): also called as *Bahya Rogamarga*
2. *Marmasthi Sandhi* (middle pathway): also called as *Madhyama Rogamarga*
3. *Koshtha* (internal pathway): also termed as *Abhyantara Rogamarga*

Shakha Rogamarga

तत्र शाखा रक्तादयो धातवस्त्वक् च, स बाह्यो रोगमार्गः,
च.सू. - 11/48

as per *Caraka*, *Shakha Rogamarga* include *Raktadi* six *Dhatu* (*Rakta, Mamsa, Medas, Asthi, Majja* and *Shukra*) and *Tvak*. The abnormalities in *Rasa Dhatu* can be observed in the assessment of *Tvak*. That is why, *Rasa* is not mentioned in *Bahya Rogamarga*. Most of the diseases manifested in the *Shakha Rogamarga* are manifested in *Tvak*.

Marmasthi Sandhi

मर्माणि पुनर्बस्तिहृदयमूर्धादीनि, अस्थिसन्धयो-ऽस्थिसंयो
गास्तत्रोपनिबद्धाश्च स्नायुकण्डरा:, स मध्यमो रोगमार्ग:,
च.सू. - 11/48

the middle compartment of body which consists of *Marma* (vital parts), *Asthi* (bones) and *Sandhi* (joints) will be coming under the umbrella of *Madhyama Rogamarga*.

Koshtha

कोष्ठ: पुनरुच्यते महास्रोत: शरीरमध्यं महानिम्नमा-
मपक्वाशयश्चेति पर्यायशब्दैस्तन्त्रे,
स रोगमार्ग आभ्यन्तर:। च.सू. - 11/48

this is the innermost compartment of the body. This comprises alimentary canal.

Diseases afflicting Shakha Rogamarga

तत्र, गण्डपिडकालज्यपचीचर्मकीलाधिमांसमषक-कुष्ठ
व्यङ्गादयो विकारा बहिर्मार्गजाश्च विसर्पश्वयथु-
गुल्माशीविद्रध्यादय: शाखानुसारिणो भवन्ति रोगा:,
च.सू. - 11/49

Ganda (swelling in the neck or temple region), *Pidaka* (papular rashes), *Alaji* (smaller rashes than *Pidaka*), *Apachi* (oozing ulcer), *Charmakila* (warts), *Adhimamsa* (mass formation), *Mashaka* (maculo papular rashes), *Kushtha* (any skin disease), *Vyanga* (skin discolouration over face) external variety of *Visarpa* (any skin ailment where in spread of the disease is very rapid such as erisepalus), *Shvayathu* (localised oedema), *Gulma* (swelling of abdominal region), *Arshas* (external haemorrhoids), *Vidradhi* (abscess).

Diseases afflicting Madhyama Rogamarga

पक्षवधग्रहापतानकार्दितशोषराजयक्ष्मास्थिसन्धिशूल
गुदभ्रंशादय: शिरोहृद्बस्तिरोगादयश्च मध्यममार्गा-
नुसारिणो भवन्ति रोगा:
च.सू. - 11/49

Pakshavadha (hemiplegia), *Pakshagraha* (hemiparesis), *Apatanaka* (tetanus), *Ardita* (facial paralysis), *Shosha* (degenerating diseases), **Rajayakshma** (severe debilitating disease), *Asthi Sandhi Shula* (pricking type of pain in bones and joints), *Gudabhramsha* (prolapse of rectum) and diseases of *Shiras* (head), *Hridaya* (heart) and *Basti* (urinary bladder).

Diseases afflicting Koshtha Rogamarga

ज्वरातीसारच्छर्द्यलसकविसूचिकाकासश्वास-
हिक्कानाहोदरप्लीहादयोऽन्तर्मार्गजाश्च विसर्पश्वय-
थुगुल्माशीविद्रध्यादय: कोष्ठानुसारिणो भवन्ति रोगा:॥
च.सू. 11/49

Jvara (fever), *Atisara* (diarrhoea), *Chardi* (vomiting), *Alasaka* (a condition where in movements of food and *Dosha* are restricted in *Amashaya* or stomach), *Visuchika* (a condition where in excess movement of *Dosha* and indigested food consumed occurs in oral and aboral route), *Kasa* (cough), *Shvasa* (breathing discomfort), *Hikka* (hiccup), *Anaha* (abdominal distension), *Udara* (ascites), *Pliha* (disease of spleen), internal variety of *Visarpa* (a condition where in fast spreading of vitiated *Dosha* is observed such as erysepalas) , *Shvayathu* (localised swelling), *Gulma* (abdominal swelling), *Arshas* (internal piles) and *Vidradhi* (internal abscess).

Significance of knowledge of Doshagati and Rogamarga

⇨ The knowledge of *Doshagati* helps in the site of *Dosha Prakopa* along with its movement inside the body. This is possible by analysing the chronology of symptoms and duration of the whole illness. For example, if the person is presented with pain in the epigastric region followed by burning sensation in the retrosternal region further followed by sour eruction, indicates the site of the *Dosha* vitiation in *Amashaya* due to the vitiation of *Pitta* moving in the upward direction predicted by the sequential occurrence of burning sensation and sour eructation.

⇨ For example, if the person earlier suffers from bloating sensation for a duration of two days followed by the presenting complaints of *Atisara* (loose stools) suggests the increase of *Vata*. Initially, we may expect the increase of *Ruksha guna* in the body and later we may predict the increase of *Chala guna* in the body.

⇨ In a patient suffering from *Kumbhakamala* (a chronic disease where liver is damaged, a state of disease where *Pitta* along with *Vata* will be associated), where the patient presents with the complaints of fullness of the abdomen associated with vomiting of blood as well as the bleeding through rectum suggests the increase of *Pitta* in the body. Depending on the duration of the illness, involvement of *Vata Dosha* is predicted.

⇨ If the person is having the presenting complaints such as *Sakapha Kasa* (cough with sputum) associated with headache and heaviness in frontal region in the morning time or soon after having nap in day time after lunch suggests the dominance of *Kapha* in the body.

⇨ Helpful in deciding the actual status of the patient and assessing the different proportions of the *Dosha* in the body. Let us discuss the example of *Raktapitta* (bleeding disorders). For example, if the person is presenting with the complaints of bleeding per rectum this will suggest the *Adhogati* of *Dosha*. If the person is presented with the complaints of bleeding per rectum associated with bleeding in the vomitus suggestive of *Urdhwa* and *Adhogati* of the *Doshas*. If the clinician gets the patient having the history of bleeding in the faecal matter, vomitus and all over the body suggestive of *Urdhwa*, *Adho* and *Tiryak gati* of *Doshas*. In the first instance, the *Dosha* vitiation is mild and in second and third instances, the severity of the *Dosha Prakopa* is progressive.

⇨ **Helpful in assessing the** *Sadhyasadhyata*¹ **of the disease** – for example, the *Lakshana* related to *Vata Prakopa* is easier to cure when compared to the *Lakshana* related to *Sannipata Prakopa*. It is easier to cure in case of patient who is having *Lakshana* related to *Urdhwagati* of the *Dosha* when compared to the *Tiryakgati* of the *Dosha*. It is easier to cure if the patient is having *Lakshana* related to *Koshtha* (*Abhyantara Rogamarga*) when compared to the *Lakshana* related to *Marmasthi Sandhi* (*Madhyama Rogamarga*) involvement. The reason for the incurability of the *Madhyama Rogamarga* is discussed elsewhere in the text.

⇨ **Helpful in deciding the appropriate management –**

☐ Let us take the example of *Raktapitta* (bleeding disorders). If the patient is showing the *Lakshana* related to the *Urdhwaga Raktapitta*, the line of the treatment is *Virechana* (purgation therapy) and in case of *Adhoga Raktapitta*, the line of treatment is *Vamana* (emesis therapy). Fundamentals of *Ayurveda* state that *Virechana* is easier in the patient of *Urdhvaga Raktapitta* and *Vamana* is difficult to perform in the patient of *Adhoga Raktapitta*.

☐ Let us take the example of *Rogamarga*. If the person is having *Lakshana* showing the *Abhyantara Rogamarga* involvement, *Shodhana* (purificatory therapy) treatment is planned before the *Snehana* (oleation therapy) and *Svedana* (fomentation therapy) depending upon the strength of the patient, duration of the disease, virulence of the *Dosha* etc. If the patient is showing the *Lakshana* related to *Bahya Rogamarga*, first the clinician has to plan the *Purvakarma*

G K 1 Let us take the example of cough in two different individuals. In one patient, the person is suffering from dry cough for past 2 days. In another patient, the person is suffering from productive cough with yellowish and reddish coloured sputum associated with fever for past 10 days. In the first instance, we can infer the dominance of *Vata Dosha* only and in the second instance, we can predict the dominance of all *Tridosha*. Thus, former patient is showing good prognosis when compared to the latter patient.

(pre-operative procedure i.e. *Dipana, Pachana, Snehana* and *Svedana*) so that the vitiated *Dosha* made to move to the *Koshtha* and later *Shodhana* is planned. Whereas in case of involvement of *Madhyama Rogamarga*, such type of *Purvakarma* (pre-operative procedure) and *Shodhana* (purificatory therapy) are less useful as far as restoration of the health is concerned or frequent *Purvakarma* and *Shodhana* are required to pacify the vitiated *Dosha* in the *Madhyama Rogamarga.*

क्षयः स्थानं वृद्धिश्च दोषाणां त्रिविधा गतिः।
ऊर्ध्वं चाधश्च तिर्यग्च विज्ञेया त्रिविधाऽपरा॥
त्रिविधा चापरा कोष्ठशाखामर्मास्थिसन्धिषु।
इत्युक्ता विधिभेदेन दोषाणां त्रिविधा गतिः॥

च. सू. 17/112-113

स्थानं स्वमानावस्थानम्। चक्र, च.सू. 17/116

Conclusion

External pathway of the disease includes *Raktadi* (*Rakta* etc) six *Dhatu* and *Tvak*. This is also being termed as *Shakha Rogamarga*. These are like branches of the tree. *Rasa* is included in *Bahya Rogamarga* as any changes in *Rasa Dhatu* can be seen in *Tvak*. That is the reason, *Rasa* is not included in *Bahya Rogamarga* and *Rasa* is included in *Tvak* itself. It is also helpful in determining the actual involvement of the tissues in the body and status of the disease. It is also helpful in determining the actual status of the disease in terms of vitiation of *Dosha* in the body, status of the abnormality of *Dosha*, status of *Srotas* in manifestation of the disease, identification of primary and secondary *Dosha* vitiation etc.

The main purpose of this section is to plan the appropriate prognosis of the disease and to plan the appropriate line of the treatment accordingly.

Key points of the chapter

- ⇨ The term Doshagati is used in terms of movement or stage of the Dosha i.e. increased or decreased state of Dosha (based on clinical features) / upward or downward or oblique movement of Dosha (movement of Dosha inside the body)/ presence of vitiated Dosha in Shakha or Koshtha or Marma etc (based on affliction of sites of the body)?
- ⇨ Two types of movement of Dosha are being explained – movement of Dosha from Koshtha to Shakha and movement of Dosha from Shakha to Koshtha.
  - ☐ Vyayama (excess exercise), Ushmanah Taikshnya (increase of Tikshna quality in the body), Hitasya Anavacharana (following unwholesome diet and regimen), Vayoh Drutatva (rapid movement of Vata) are leading to the movement of Dosha from Koshtha to Shakha.
  - ☐ Dosha Vriddhi (vitiation of Dosha in the body; Vishyandana (liquefaction of etiological factors), Paka (suppuration); Srotomukha Vishodhana (cleansing of the Srotas) Vayoh Nigraha (suppressing the movement of Vata)
- ⇨ Rogamarga is the pathway of manifestation of the disease. 3 Rogamargas are mentioned – Bahya (Shakha); Madhyama (Marma, Asthi, Sandhi) and Abhyantara (Koshtha). Among these, diseases afflicting Abhyantara Rogamarga are comparatively easy to cure; Bahya Rogamarga involvement in a individual makes little bit difficulty in management as these vitiated Dosha need to be brought to Koshtha and thereby we can eliminate through alimentary canal. Whereas in Madhyama Rogamarga in an individual is most difficult to cure as it requires much intensive patient care.

Chapter Resources

1. Charaka Samhita, Ashtanga Hridaya excerpts
2. Website materials

Probable questions may be asked in the examination

Long essays

- ⇨ Explain the types of Doshagati & explain how Dosha travels from Koshtha to Shakhamarga

Short essays

- ⇨ Define Rogamarga explain the concept with suitable examples
- ⇨ Define Doshagati and explain with suitable examples
- ⇨ Doshagati
- ⇨ Explain the concept of Doshanam Shakhat Koshthabhigamana
- ⇨ Explain the concept of Doshanam Koshthat Shakhabhigamana
- ⇨ Describe Trayo Rogamarga

Short answers

- ⇨ Write a short note on Doshagati
- ⇨ Which are the factors that cause Doshagati from Shakha to Koshtha?
- ⇨ Write a short note on Rogamarga
- ⇨ What is Abhyantara Rogamarga?
- ⇨ Abhyantara Rogamargagata Roga
- ⇨ Mention five diseases afflicting Madhyama Rogamarga
- ⇨ Write the significance of Doshagati in Roga Nidana
- ⇨ Write the significance of Rogamarga in Roga Nidana
- ⇨ Write Koshtha to Shakha Gamana of Dosha
- ⇨ Write Madhyama Marga Vyadhi
- ⇨ Write Rogamarga with example.

MCQs

1. **Bahya Rogamarga is also known as**
   a. Shakha;
   b. Madhyama;
   c. Koshtha;
   d. Abhyantara
   Answer -(a)
2. **Pakshaghata is considered as .... Rogamargashrita Vikara.**
   a. Madhyama;
   b. Bahya;
   c. Abhyantara;
   d. Koshtha
   Answer -(a)
3. **Jvara is considered as .... Rogamargashrita Vikara.**
   a. Madhyama;
   b. Bahya;
   c. Abhyantara;
   d. Shakha
   Answer -(c)
4. **The Doshagati in Urdhvaga Raktapitta is**
   a. Urdhva;
   b. Adha;
   c. Tiryak;
   d. None of the above
   Answer -(a)
5. **Which of the following reason is responsible for the movement of Dosha from Shakha to Koshtha?**
   a. Dosha Vriddhi;
   b. Paka;
   c. Vishyandana;
   d. All of the above
   Answer -(d)

6. **Which of the following is not included in Madhyama Rogamarga?**
   a. Janu Sandhi;
   b. Basti;
   c. Hridaya;
   d. Amashaya

   Answer -(d)

7. **Which of the following diseases may involve both Abhyantara and Bahya Rogamarga?**
   a. Arshas;
   b. Vidradhi;
   c. Gulma;
   d. All of the above

   Answer -(d)

8. **Mahanimna is the synonym of .... Rogamarga.**
   a. Bahya;
   b. Madhyama;
   c. Abhyantara;
   d. All of the above

   Answer -(c)

9. **Abhyantara Rogamarga is related to which of the following terms?**
   a. Mahasrotas;
   b. Sharira Madhya;
   c. Amapakvashaya;
   d. All of the above

   Answer -(d)

10. **Shvasa is a disease involves which of the following Rogamarga?**
    a. Abhyantara;
    b. Madhyama;
    c. Bahya;
    d. All of the above

    Answer -(a)

***

12

Concept of Srotas

Learning objectives

- ⇨ To have the clear understanding of the meaning of Srotas
- ⇨ To have the understanding of the manifestation of disease when Sroto Vaigunya or Sroto Dushti happens
- ⇨ To know the difference between Kha Vaigunya and Srotodushti.
- ⇨ To have the understanding of Sroto dushti Prakara and its clinical application
- ⇨ Clinical application of Srotodushti Karana and Lakshana

Introduction[1]

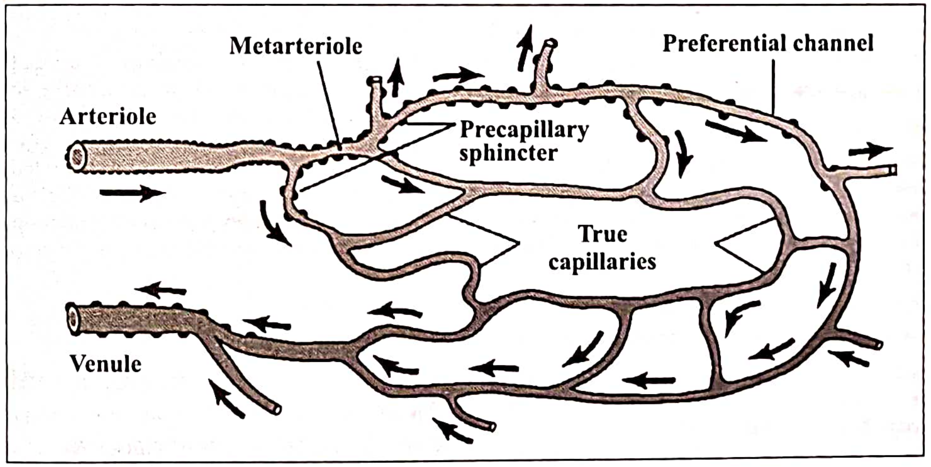


Fig 12.1: Microcirculation and direction of blood flow

Srotases are the channels that carry components, nutrients, metabolites, signals and reflexes from one particular place to the another place. In other words, these substances are carried from the site of production to the target tissues. Some *Srotas* can be understood anatomically such as *Pranavaha Srotas* and some other *Srotas* can be understood physiologically such as *Svedavaha Srotas* or *Manovaha Srotas*. *Srotas* will carry *Dosha*, *Dhatu*, *Upadhatu* and *Mala* from one place to the other. That means there will be definitely abnormality of *Srotas* can be seen if one can identify the abnormality of

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G K [1] Structure of meseteric capillary bed, the diameter of the capillary is 4 to 9 micrometers and thickness of the capillary wall is 0.5 micrometer. Blood flow in the capillaries is not continuous, it is intermittent. That means the intermittent blood flow may be present for every few seconds to few minutes. The cause of such phenomena is due to the presence of metararterioles and pre capillary sphincters.

Dosha, Dhatu, Upadhatu and *Mala.*

- ⇨ The anatomical and physiological pathways which carry all the components, elements, reflexes, signals from one place to another are coming under the gross heading of *Srotas.*

Derivation of Srotas

The word *Srotas* is derived from the *Dhatu* **सु स्रवणे**. This has different meanings – to exude, to ooze, to filter or to permeate. Because of the function of *Sravana*, these are called as *Srotas.*

स्रवणात् स्रोतांसि। च.सू. - 30/12

स्रवणादिति रसादेरेव पोष्यस्य स्रवणात्। चक्र, च.वि.- 30/12

It is the channel which helps in transportation of substances is called *Srotas.* In this context, the transportation of nutrient substances to different cells and tissues should be considered for the term *Sravana.*

स्रोतांसि खलु परिणाममापद्यमानानां धातूनाम-भिवाहीनि भवन्त्ययनार्थेन। च.वि. - 5/3

Srotas are those channels which carry the transformed *Dhatu* or the *Dhatus* undergoing transformation to different parts of the body through their different forms of network to nourish the different cells and tissues.

मूलात् खादन्तरं देहे प्रसृतं त्वभिवाहि यत्।
स्रोतस्तदिति विज्ञेय सिराधमनीवर्जितम्॥ सु.शा. - 9/13

Srotas is defined as empty spaces spread to entire body, which originates from root space except *Sira* and *Dhamani.*

Characters of Srotas

स्वधातु समवर्णानि वृत्तस्थूलान्यणूनि च।
स्रोतांसि दीर्घाण्याकृत्या प्रतानसदृशानि च॥ च.वि. - 5/25

- ⇨ *Srotas* will have the same colour of the *Dhatu* in which they circulate in entire body.
- ⇨ Some *Srotas* are circular in nature
- ⇨ Some *Srotas* are big and some are small
- ⇨ Some *Srotas* are resembling the lines of leaf or reticular in nature.

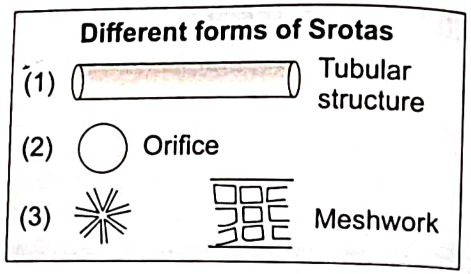

Fig 12.2: Different forms of Srotas

Circular opening such as mouth, nasal orifice where diameter can be

The small tubular structures can be considered as *Srotas.*

Large tubular structures such as alimentary canal can also be considered as *Srotas.*

Structures such as formation of mesh network can also be called as *Srotas.*

- ⇨ Based on different meanings of *Srotas*, the *Srotas* refers to either an orifice like *Asya* (oral cavity) or any tubular structure like *Sira* (vein) or even a single cell. A careful study of *Srotas* shows that the knowledge of internal transport system of the body had reached a high degree of development, even as early as the time of *Punarvasu Atreya.*

Importance of Srotas in pathogenesis

वातपित्तश्लेष्मणां पुनः सर्वशरीरचराणां सर्वाणि स्रोतांस्ययनभूतानि, तद्वदतीन्द्रियाणां पुनः सत्वादीनां केवलं चेतनावच्छरीरमयनभूतमधिष्ठानभूतं च।
तदेतत् स्रोतसां प्रकृतिभूतत्वान्न विकारैरुपसृज्यते।

च.वि. - 5/7

- ⇨ The *dosha Vata, Pitta* and *Kapha* move inside the *Srotas* to perform their normal functions at different places similarly things which are beyond perception of sensory organs and mind etc move inside the *Srotas* and are located in each part of the body. Healthy *Srotases* perform their normal functions, the outcome is the body will be free from diseases and unhealthy *Srotases* will become the root cause for the development of disease process.

अहितसेवनात् तानि दुष्टाय रोगाय विशुद्धानि सुखस्य च।
अ.हृ.शा. - 3/42

- ⇨ Improper food and dietetics and improper regimen and erratic behaviour which are not conducive to the body will lead to the abnormality in *Srotas* which in turn leads to the manifestation of the disease. Therefore, the following of normal healthy food and habits will lead to the happiness and health.
- ⇨ The knowledge of *Srotas* will be helpful restricting the diagnosis of disease related one or multiple *Srotas*, so that prognosis can be assessed and proper management can be planned. For example, if the person has the presenting complaints such as *Dravamala Pravritti*, one can infer the involvement of *Purishavaha Srotas.* If the person has the presenting complaints such as *Dravamala Pravritti* associated with *Jvara* and *Avipaka*, one can assume the involvement of *Annavaha, Rasavaha* and *Purishavaha* Srotas. If the person is presenting with itching and discolouration of the skin, then we can suspect the involvement of *Rasavaha, Raktavaha* and *Mamsavaha Srotas.* When the person is presented with the complaints of difficulty in micturition or painful micturition, one can suspect the involvement of *Mutravaha Srotas.*

ते चावकाशाः प्रकुपिताः स्थानस्थान्मार्गस्थांश्च
धातून् प्रकोपयन्ति।
तेऽपि कुपितास्तानि स्रोतांसि।
स्रोतांसि च स्रोतांसि।
धातवश्च धातून्।
तेषां सर्वेषामेव दूषयितारो दुष्टा दोषाः।
ते च प्रायशो दुष्यन्त्यग्निदोषान्।
तस्मात्तमित्तान्यायुरारोग्य भवन्ति। A.S.Sha. – 6/22
तेषां प्रकोपात् स्थानस्थाश्चैव मार्गगाश्च शरीरधातवः
प्रकोपमापद्यन्ते, इतरेषां प्रकोपादि-तराणि च।
स्रोतांसि स्रोतांस्येव, धातवश्च धातूनेव प्रदूषयन्ति प्रदुष्टाः।
तेषां सर्वेषामेव वातपित्तश्लेष्माणः प्रदुष्टा दूषयितारो भवन्ति, दोषस्वाभावादिति॥9॥ Ca.Vi. – 5/9

- ⇨ Once, the empty spaces become abnormal, it will result in the abnormality in *Dhatu* by not transporting the nutrient elements to the target area, this is mainly because of the abnormality in the *Srotas.*
- ⇨ Abnormal *Srotas* will lead to the abnormality in one or other *Srotas.* Abnormal *Dhatu* will lead to the abnormal *Dhatu* in one or other part of the body. The main reason for the abnormal functioning of the *Dhatu* is abnormal functioning of Agni (digestive fire)
- ⇨ Abnormality in the *Srotas* will lead to the malfunctions in *Sthanastha* (regional body tissues) and *Margaga* (circulating body tissue) *Dhatu.*

Synonyms of Srotas

स्रोतांसि, सिराः, धमन्यः, रसायन्यः, रसवाहिन्यः, नाड्यः, पन्थानः, मार्गाः, शरीरच्छिद्राणि, संवृतासंवृतानि, स्थानानि, आशयाः, निकेताश्चेति शरीरधात्ववकाशानां लक्ष्यालक्ष्याणां नामानि भवन्ति। Ca.Vi. – 5/9

Sira, Dhamani, Rasayani, Rasavahini, Nadi, Pantha, Marga, Sarira chidra, Samvrita – Asamvrita, Sthana, Ashaya and *Niketa.* If you analyse these synonyms, the term *Srotas* has different meanings – tubular structure, orifice or pores. The detailed explanation regarding the structure of the *Srotas* is being described above images. in the context of concept of structure of *Srotas.*

Types of Srotas

- ⇨ As per *Sushruta*
  - ☐ *Bahya*: males – 9
    - ● Females - 12
  - ☐ *Abhyantara* – 11 pairs
    - ● *Pranavaha Srotas*
    - ● *Udakavaha Srotas*
    - ● *Annavaha Srotas*
    - ● *Rasavaha Srotas*
    - ● *Raktavaha Srotas*

- *Mamsavaha Srotas*
- *Medovaha Srotas*
- *Shukravaha Srotas*
- *Mutravaha Srotas*
- *Purishavaha Srotas*
- *Artavavaha Srotas*

⇨ **As per *Sharangadhara***

- ☐ *Bahya Srotas* – Male – 10 and female – 13
  - Males:
  - Eyes – 2
  - Ears – 2
  - Nostrils – 2
  - Oral cavity – 1
  - Genital – 1
  - Anus – 1
  - *Mastaka randhra* (brain canal) – 1
- ☐ **Females:**
  - Above 10
  - Breasts – 2
  - Vaginal orifice – 1

⇨ **As per *Caraka*:**

- ☐ 2 types – *Abhyantara* and *Bahya*.
  - *Bahya Srotas* is 9 in number in males and 12 in females, namely two eyes (*Netra*), two ears (*Karna*), two *Nasa randhra* (nostril), one *Mukha* (oral cavity), one *Guda* (anus), one *Medhra* (urethral orifice).
  - Where as in females, three extra orifices are present – two Stana (breast) and one *Apatya patha* (vaginal orifice).
- ☐ *Abhyantara* – 13
  - *Pranavaha Srotas*
  - *Udakavaha Srotas*
  - *Annavaha Srotas*
  - *Rasavaha Srotas*
  - *Raktavaha Srotas*
  - *Mamsavaha Srotas*
  - *Medovaha Srotas*
  - *Asthivaha Srotas*
  - *Majjavaha Srotas*
  - *Shukravaha Srotas*
  - *Mutravaha Srotas*
  - *Purishavaha Srotas*
  - *Svedavaha Srotas*

Importance of Srotomula

Let us assume a schematic diagram of a *Srotas* which contains five different parts 1,2,3,4 and 5 and having two ends A and B. If one observes the symptoms related to any part from 1 to 5, there is every possibility of affliction of either A or B or both ends in due course of time sooner or later. Further, if there is involvement of part 1 or 2, there is more chance of involvement of *Srotomula* A in the pathogenesis initially if there is involvement of part 3 is observed, there is a possibility of involvement of A or B or both may be possible and if there is involvement of 4 or 5, there is possibility of involvement of *Srotomula* B is more likely.

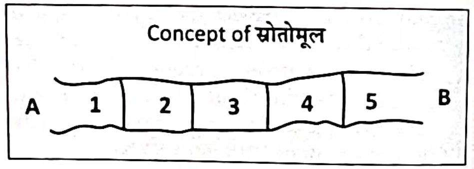

Fig 12.3: Concept of Srotomula

Srotomula: The information on *Srotomula* is highly essential as *Srotodushti* of any *Srotas* may disturb the functions of *Srotomula* in due course of time sooner or later depending upon the virulence of *Srotodushti Karana* and duration of contact with *Dushti Karana*. For example, if the person is presenting with the symptoms of cough and breathlessness, we can assume the involvement of *Pranavaha Srotas*. Indirectly, this implies that there may be a possibility of involvement of *Hridaya* or *Mahasrotas* in due course of time as these are *Srotomula* of *Pranavaha Srotas*. In other words, if the person is presenting with chest discomfort, cough, breathlenssness, we may infer that the person is having the affliction of *Hridaya*, one can suspect the involvement of *Pranavaha* and *Rasavaha Srotas* in due course of time.

Table 12.1: Names of different Srotas, Srotomula as per Charaka and Sushruta

Srotas	As per Charaka	As per Susruta[2]
Pranavaha	Hridaya, Mahasrotas	Hridaya, Rasavahi Dhamani
Udakavaha	Talu, Kloma	Talu, Kloma
Annavaha	Amashaya, Vamaparshwa	Amashaya, Annavahi Dhamani
Rasavaha	Hridaya, Dasa Dhamani	Hridaya, Rasavahi Dhamani
Raktavaha	Yakrit, Pliha	Yakrit, Pliha, Raktavaha Dhamani
Mamsavaha	Snayu, Tvak	Snayu, Tvak, Raktavahi Dhamani
Medovaha	Vrikka, Vapavahana	Kati, Vrikka
Asthivaha	Medas, Jaghana	Not mentioned
Majjavaha	Asthi, Sandhi	Not mentioned
Sukravaha	Vrishana, Sephas	Stana, Vrishana
Purishavaha	Pakvashaya, Sthulaguda	Pakvashaya, Guda
Mutravaha	Basti, Vamkshana	Basti, Medhra
Svedavaha	Medas, Lomakupa	Not mentioned
Artavavaha	Not mentioned	Garbhashaya, Artavavahi Dhamani

Samanya Sroto dushti Karana

आहारश्च विहारश्च यः स्याद्दोषगुणैः समः।धातुभिर्विगुणश्चापि
स्रोतसां स प्रदूषकः।। Ca.Vi. – 5/23

Ahara (diet) and *Vihara* (regimen) which has the qualities similar to the *Dosha* and *Karana* which are responsible for the abnormality of *Dhatu* are considered to be *Samanya Sroto dushti Karana*. For example, the consumption of *Dadhi* (curds), *Kshira* (milk), *Madhura* substances, *Masha* (black gram) are responsible for the vitiation of *Kapha Dosha*.[3] *Kapha Dosha* will be aggrevated if the person is going to sleep immediately after the lunch. This is responsible for the vitiation of *Rasavaha* or *Mamsavaha* or *Medovaha* or *Majjavaha* or *Shukravaha* or *Mutravaha* or *Purishavaha Srotas* depending upon the *Khavaigunya* (micro abnormality in *Srotas*. If the person consumes *Katu rasa* substances, more amount of chat items, gobi Manchurian etc; *Amla Dadhi* (sour curds) are resulting in *Pitta* vitiation in the body. Consumption of more amount of *Amla Takra* (sour butter milk) will lead to the abnormality of *Rakta Dhatu*. Thus, consumption of buttermilk, sour curds will lead to the vitiation of *Raktavaha Srotas*. Consumption of more amount of *Dadhi* (curds) may lead to vitiation of *Medas* and *Majja*.

The causative factor which is leading to the abnormality of *Dhatu* need not be having the opposite quality of *Dhatu*. For example, when the person is consuming excess substances which lead to the increase of *Medo Dhatu* will vitiate the *Medovaha Srotas*.

Samanya Sroto Dushti Lakshana

अतिप्रवृत्तिः सङ्गो वा सिराणां ग्रन्थयोऽपि वा। विमार्गगमनं
चापि स्रोतसां दुष्टिलक्षणम्।।24।। Ca.Vi. – 5/24

As per *Charaka*, there are four types of *Sroto Dushti* which may occur in the body. These are also called *Sroto Dushti Prakara* or *Samanya Sroto*

GK

[2] Why *Sushruta* did not mention *Asthi, Majja* and *Svedavaha Srotas*? *Asthivaha, Majjavaha* and *Svedavaha Srotas* are all pervading the body. Symptoms occurring after to all parts of the body is impractical and prognosis cannot be analysed by this mechanism. That is why trauma to these *Srotas* and their symptoms are not described by *Sushruta*. *Dalhana* says *Srotomula* of *Asthivaha Srotas* which is *Medas* present all over the body and *Mula* of *Majjavaha Srotas* is *Asthi* present all over the body and *Mula* of *Svedavaha Srotas* is *Medas* present all over the body. You cannot say involvement of *Srotomula* in these occasions as the substance present all over the body. It is clearly stated that if you observe the involvement of whole body as *Srotas* involved, then person belonging to *Kayachikitsa* specialty should treat the condition.

[3] This concept is understood based on the concept of *Ashraya* and *Ashrayi Bhava*.

Dushti Lakshana. They are *Atipravritti*, *Sanga*, *Siragranthi* and *Vimargagamana*. These types are described based on the visible or external clinical features observed in the diseased individuals, not based on the pathological process happening in the body.

Ati pravritti: the word '*Ati pravritti*' refers to excessive movement in natural course i.e. urethra, anus, vagina or eyes. If the person presents with excessive movement of semisolid or liquid stools or the excessive movement of *Mutra* from the body are the examples for *Ati pravritti*. Passage of blood per rectum is not an example for *Ati pravritti*. Excessive vomiting is also not an example for *Ati pravritti*. as these substances are not expelled through their natural course in case of bleeding per rectum and in case of vomiting, it occurs due to the reverse movement of *Pranavata* which is not a usual course of *Pranavata* normally.

Sanga: the word '*Sanga*' means obstruction. Most of the diseases are considered to be manifested due to this type of *Srotodushti*. If the person presents with the complaints of constipation is an example for *Sanga*. If the person presents with the complaints of reduced passage of urine with swelling in the lower abdomen, supra pubic region in particular is an example for *Sanga*. If the person is presented with swelling in the epigastric region, we can predict the *Sanga* at the level of *Amashaya*. This pathological mechanism is usually associated with *Vimargagamana* which is being discussed below.

***Siragranthi*: धमनी प्रतिचय: सिराज ग्रन्थि:** *Chakra*, Ca.Su. – 26/84. *Dhamani Pratichaya* is one pathological phenomenon occurs inside the blood vessels *Chakra*, Ca.Su. – 26/84. *Dhamani Pratichaya* is one pathological phenomenon occurs inside the blood vessels *Siragranthi* refers to the swelling arising from vessels. *Arbuda* (tumour) is an example for *Siragranthi*. *Arshas* (haemorrhoids), varicose veins in the lower limbs are some examples for *Siragranthi*.

Vimargagamana: *Vimargagamana* refers to the deviation in the movement of *Dosha* or *Dushyas* than usual movement of these elements in the body. This type of *Srotodushti* is usually preceded by *Sanga*. For example, if the person presents with the complaints of vomiting is an example for *Vimargagamana*. At first one may expect the *Sanga* at *Amashaya* followed by *Viloma pravritti* of *aggrevated Dosha*. *Adhoga Raktapitta*, (bleeding diatheses afflicting lower orifices, such as anus, urethra, vagina), *Urdhvaga Urdhvaga Adhoga Amlapitta*, (disease associated with sour and bitter eructations, burning sensation in the throat and retrosternal region), *Kushtha*, (any type of skin lesion) *Jvara* (disease where raised body temperature is seen) are different examples of *Vimargagamana* type of *Srotodushti*.

Samanya Sroto Viddha Lakshana

In this description, the term *Viddha* refers to injury. The injury may be trivial such as simple cut happens in the kitchen or during fall while running or while treatment such as receiving parenteral nutrition or post surgical trauma to fatal ones such as road traffic accident or head injury.

व्यधे तु स्त्रोतसां मोहकम्पाध्मानवमिज्वरा:।
प्रलापशूलविण्मूत्ररोधा मरणमेव वा॥47॥
स्त्रोतोविद्धमतो वैद्य: प्रत्याख्याय प्रसाधयेत्।
उद्धुत्य शल्य यत्नेन सद्य:क्षतविधानत:॥48॥

A.Hr.Sha. – 3/47-48

The Lakshana observed when an injury happens to Srotas are

- ⇨ *Moha* (altered state of consciousness)[4],
- ⇨ *Kampa* (involuntary movements)[5],

- ⇨ *Adhmana* (distension of the abdomen)[6],
- ⇨ *Vami*[7] (vomiting),
- ⇨ *Jvara* (fever)[8],
- ⇨ *Pralapa* (irrelevant speech)[9],
- ⇨ *Shula* (pricking type of pain)[10],
- ⇨ *Vinmutra Rodha* (obstruction of urine and faeces)[11]
- ⇨ *Marana* (death)[12] – may be either *Sadyo Marana* (death of the person within 7 days) or death after a period of 7 days of the injury

By noting the above said symptoms, the clinician has to inform the patient's attendant regarding the poor prognosis of the situation. Later, plan the line of treatment after removing the foreign body and manage the wound as per acute wound management.

व्यधे तु स्त्रोतसां भ्रममोहकम्पप्रलापाध्मानशूलारुचि-
तृद्छर्दिज्वरातिरुधिरस्त्रुतिमूत्रपुरीषरोधा मरणं च।
तस्मात्स्त्रोतोविद्धं प्रत्याख्यायोपाचरेत्।
उद्धृतशल्यं च सद्योव्रणविधानेन॥19॥ A.S.Sha. – 6/19

The *Lakshana* observed during the injury to *Srotas* are *Bhrama* (giddiness), *Moha* (altered state of consciousness), *Kampa* (involuntary movements), *Pralapa* (irrelevant speech), *Adhmana* (distension of the abdomen), *Shula* (pricking type of pain), *Aruchi* (tastelessness), *Trit* (thirst), *Chardi* (vomiting), *Jvara* (fever), *Atirudhira Sruti* (excess bleeding from the injured region), *Mutra Purisha Rodha* (obstruction of passage of urine and stools) and *Marana* (death). Therefore, the clinician has to treat the patient by informing the poor prognosis of the situation and treatment should be similar to *Sadyovrana* (acute wound) after removing the foreign body.

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[4] This type of presenting complaint is considered to be due to the state of hypovolemia where in the person will receive minimum blood supply and thus leading to syncopal attack.
⇨ The person who is suffering from hyponatremia can present with altered state of consciousness.

[5] This kind of presenting complaint is attributable to clinical features of tetanus which results due to trauma. Tetanus is characterised by painful muscular contractions (*Kampa*), jaw and neck in particular. In severe cases, the person will present with breathlessness leading to death.

[6] When the person is presented with profound water/ blood loss, this is responsible for the activation of sympathetic nervous system in general. During hypovolemia, there will be tachycardia, tachypnoea, leading to activation of sympathetic nervous system. Activation of sympathetic nervous system on alimentary canal is of two folds: on gastro intestinal lumen decreased peristalsis and decreased tone and on sphincters, increased tone of the sphincters are seen. Probably this could be the reason for the distension of the abdomen.

[7] Vomiting is specifically seen in case of head injuries where there is increased intracranial pressure is the cause of vomiting. This is not associated with nausea.

[8] When the person is exposed to any kind of trauma, he is exposed to multiple microorganisms depending upon the nature of injury, nature of blood loss and nature of immune status of the individual.

[9] When the person is met with head injury, then he may be likely to have irrelevant speech. It may be in the form of non fluent speech in case of sensory speech area involvement (parietal lobe affliction) or fluent speech in case of involvement of motor speech area (frontal lobe affliction).
Another major cause of irrelevant speech during trauma is hypovolemic hyponatremia. This is characterised by headache, confusion, irrelevant speech or even coma can be observed.

[10] Pain occurring due to injury can happen due to three different reasons:
1. Release of chemical occurring due to the tissue damage or bacterial infection or tissue contusion. E.g. release of bradykinin, serotonin, histamine, potassium ions, acetylcholine, proteolytic enzymes. Intensity of pain is more in case of release of potassium ions or the increase of proteolytic enzymes.
2. Tissue ischemia (reduced blood supply to the damaged area) – this is responsible for the elevation of lactic acid in the tissues which is formed as a consequence of anerobic metabolism.
3. Muscle spasm occurring as a result of trauma to the injured part. This occurs as a result of activation of mechanoreceptive

[11] This is attributable to the state of hypovolemic shock. This is leading to cessation of urine and passage of very hard stools.

[12] This is attributable to multifactorial causes. To name a few,
1. Head injury – leading to the state of coma
2. Hypovolemia – leading to circulatory impairment, minimum blood supply to the heart, leading to shock syndrome
3. Injury to major organs of the body such as kidney, urinary bladder etc
4. Infection of the injured part of the body if no proper care was given

Table 12.2: Difference between Khavaigunya and Srotodushti

Kha Vaigunya	Sroto Dushti
Begins soon after the exposure to etiological factor	Begins at a much later stage after the exposure to etiological factor
Commences during the stage of Sanchayavastha	Commences during the stage of Sthanasamshrayavastha
Dosha Dushya Sammurchana will not occur during the pathogenesis	Dosha Dushya Sammurchana will occur during the pathogenesis
Purvarupa will not be observed in this stage	Purvarupa will be observed in this stage

The difference between Khavaigunya and Srotodushti

The term *Khavaigunya* comprises two words *Kha* and *Vaigunya*. In *Ayurvedic* literatures, the term *Kha* refers to *Akasha Mahabhuta* or space. The term *Vaigunya* refers to abnormal function. *Srotodushti* comprises two terms *Srotas* and *Dushti*. The term *Srotas* refers to channels and *Dushti* refers to abnormality.

Pranavaha Srotas

Pranavaha Srotomula:

तत्र प्राणवहानां स्रोतसां हृदयं मूलं महास्रोतश्च। च.वि.- 5/8

तत्र प्राणवहे द्वे, तयोर्मूलं हृदयं रसवाहिन्यश्च धमन्यः॥

सु.शा. 9/12

The *Mula* (sites of origin) of *Pranavaha Srotas* as per *Caraka* are *Hridaya* (heart) and *Mahasrotas* (alimentary canal). In other words to say, these are the origins of the *Pranavaha Srotas*. Whereas as per *Sushruta*, *Pranavaha Srotas* are two in number and their sites of origin are *Hridaya* (heart) and *Rasavahi Dhamani* (channels carrying *Rasa*).

Based on the description, we can able to conclude the sites of origin of *Pranavaha Srotas* are heart and alimentary canal. In case of affliction of either of site of origin, there will be manifestation of *Lakshana* of *Pranavaha Srotas*. In other words, entry of etiological factors are from exogenous cause generally arise from alimentary canal and endogenous cause arise from blood.

क्षयात् संधारणाद्रौक्ष्याद्व्यायामात् क्षुधितस्य च।
प्राणवाहीनि दुष्यन्ति स्रोतांस्यन्यैश्च दारुणैः॥10॥

Ca.Vi. – 5/10

- ⇨ *Kshaya* – *Dhatukshaya*[13] (depletion of Dhatus in the body);
- ⇨ *Sandharana* means *Vega Sandharana* (suppression of natural urges such as *Purisha*[14], *Mutra*, *Svasa*, *Kasa* etc);
- ⇨ *Roukshya* (increase of *Ruksha Guna* either by *Ahara* such as *Ruksha Bhojana* or consumption of bitten rice[15] or *Vihara* such as *Jagarana*);
- ⇨ *Kshudhitasya Vyayama* (exercise during hunger or starvation)[16];
- ⇨ *Daruna Karma* (heavy exercises)[17] are responsible for the *Dushti* of *Pranavaha Srotas*.

Dushti Lakshana of Pranavaha Srotas

प्रदुष्टानां तु खल्वेषामिदं विशेषविज्ञानं भवति, तद्यथा अतिसृष्टमतिबद्धं कुपितमल्पाल्पमभीक्ष्णं वा सशब्दशूल मुच्छ्वसन्तं दृष्ट्वा प्राणवहान्यस्य स्रोतांसि प्रदुष्टानीति विद्यात्॥ च.वि. -5/8

- ⇨ *Atisrishta Svasa* (increased phase of respiration)[18];
- ⇨ *Atibaddha Svasa* (reduced or cessation of respiration)[19];
- ⇨ *Kupita Svasa* (breathlessness associated with features related to vitiation of *Dosha*)[20];
- ⇨ *Alpalpa Svasa* (increased short phases of respiration)[21];
- ⇨ *Sasabda Svasa* (respiration associated with sounds)[22] and *Sasula Svasa* (respiration associated with pain)[23]

Viddha Lakshana of Pranavaha Srotas

तत्र विद्धस्याक्रोशनविनमन मोहन भ्रमण वेपनानि मरणं वा भवति॥ सु.शा. - 9/12

- ⇨ *Akroshana* (the person will cry with loud sound)[24];
- ⇨ *Vinamana* (forward bending)[25];
- ⇨ *Mohana* (altered state of consciousness)[26];

GK

[13] In this situation, the term contextually refers to hypovolemia. This can cause respiratory distress in two different ways.
1. Development of shock with reduced cardiac output
   a. Cardiac abnormalities that decrease the ability to pump blood. Diseases such as arrhythmias, valvular dysfunctions, old myocardial infarction
   b. Factors that reduce venous return – most commonest cause is reduced blood volume
2. Development of shock without reduced cardiac output – this can result from
   a. Excess metabolism of the body, so that even cardiac output is inadequate
   b. Abnormal tissue perfusion patterns due to hyponatremia or hypoproteinemia etc.

[14] Let us take the example of suppression of faecal matter and its relation with respiratory system. Large intestine is mainly having two portions as far as functional anatomy is concerned namely absorptive colon and storage colon. Absorptive colon is mainly concerned with absorption of sodium and water from the colon. Nearly 1,500 ml of chyme from ileocaecal valve will be reduced to 100 ml when it enters the rectum.
If the person suppresses the urge of defaecation, then it will be responsible for the increased absorption of salt and water from absorptive colon. This is leading to the increase in volume of the blood, this leads to the increase in pulmonary pressure and thereby leading to the pulmonary congestion.

GK

[15] Consumption of substances having Ruksha quality is responsible for the activation of parasympathetic nervous system. It has two different actions on alimentary canal and respiratory passages. In the alimentary canal, parasympathetic activation leads to the copious secretion of digestive juices where as parasympathetic activation in respiratory tract leads to the contraction of bronchioles. This will hamper the functions of respiratory system.

[16] In this, due to the enhanced exercise, the person will be developing the hypovolemia and reduced renal perfusion, there will be shift in the metabolism from carbohydrate to fat metabolism. This is responsible for the metabolic acidosis wherein mechanism of ketoacidosis will be observed. Thus, the person may show abnormal breathing pattern.

[17] Mechanism of the pathophysiology is similar to the description mentioned in exercise during hunger.

[18] Increased rate (tachypnoea) and depth (hyperpnoea) are seen in the conditions where increased demand for ventilation is seen such as exercise, fever, thyrotoxicosis, acidosis and conditions of lungs and heart associated with hypoxia or hypercapnia.

[19] Decreased respiratory rate is seen during sleep and depression of respiratory centre due to cerebral disease and consumption of narcotic drugs.

[20] In case of *Pitta* vitiation, the person may present with breathlessness associated with cough with yellowish or greenish or pus mixed sputum. In case of *Kapha* vitiation, the person may present with breathlessness associated with whitish and thick sputum.

[21] This is seen in conditions of pleural involvement where in irritation of parietal and visceral pleura occurs during deep inspiration.

[22] In case of respiratory disease, added sounds observed are rhonchi, crepitation and pleural friction rub. The presence of rhonchi implies the bronchospasm or broncho constriction; the presence of crepitation in the chest suggests the presence of free fluid in the alveoli and diagnosis of pleurisy can be made on the presence of pleural friction rub.

[23] The presence of pain in the sides of the chest on respiration indicates the pleural inflammation.

[24] This is attributable to severe pain depending upon the injury to the chest either retrosternal region or sides of the chest. The pain will be very severe so much so that even breathing, coughing will be painful.

[25] Forward bending is responsible for the relaxation of abdominal muscles which in turn helps in the relaxation of the thoracic muscles too.

[26] This symptom is attributable to the syncopal episode which is characterised by altered state of consciousness in the sitting posture and recumbent posture may help the patient to recover from the syncopal attack. In case of serious injury to the heart, the person may go into the state of coma due to cerebral

- ⇨ *Bhramana* (giddiness)[27];
- ⇨ *Vepana* (involuntary movements)[28];
- ⇨ *Marana* (sudden death)[29]

Respiratory system

⇨ Respiratory system can be divided into two parts – upper respiratory tract and lower respiratory tract. Functionally, these are divided into conducting portion and respiratory portion.

1. Conducting portion consists of nose,[30] pharynx, larynx, trachea and series of bronchi and bronchioles till terminal bronchioles[31]
2. Respiratory portion consists of alveolar ducts, alveolar sacs and alveoli where exchange of gases takes place

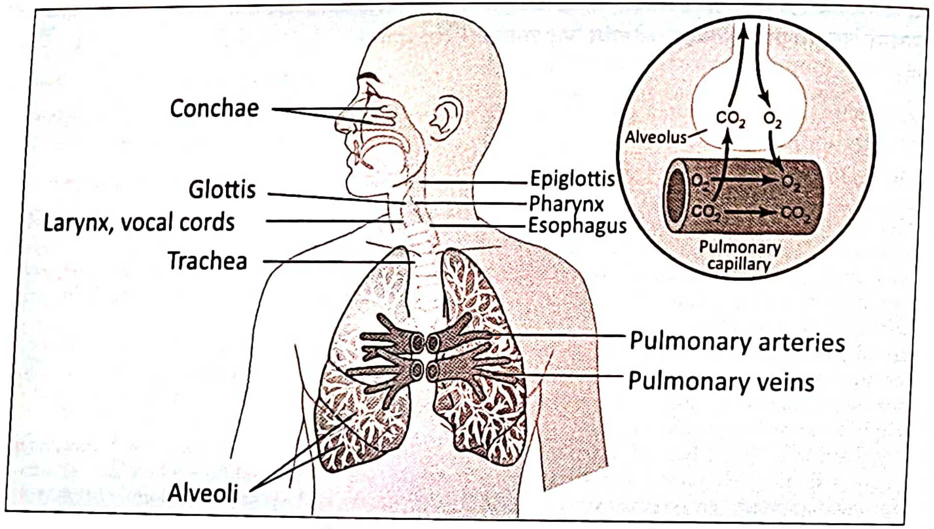

Fig 12.4: Respiratory system

⇨ The main goals of respiratory system are to provide the oxygen to the peripheral tissues and to remove carbon dioxide from the tissues to the exterior. To achieve these goals, respiratory physiology is divided into 4 major functions:

1. Pulmonary ventilation[32] – inflow and outflow of air between atmosphere and alveoli occurs at the level of nose to alveoli level
2. Diffusion of oxygen and carbon dioxide between the alveoli and blood occurs at the level of alveoli
3. Transport of oxygen and carbon dioxide in the blood and body fluids to and from tissues cells of the body occurs at the level of blood
4. Regulation of respiration and other facets of respiration[33] occurs at the level of brain and other autonomic nervous system which controls the physiology of respiration

Cardiovascular system

⇨ Cardiovascular system[34] comprises of heart and blood vessels. Heart is a four chambered organ and blood vessels include arteries, arterioles, capillaries, venules and veins.

⇨ Heart:[35] is a four chambered, muscular organ situated in the middle mediastinum in between the two lungs. It is made up of two atria and two ventricles.

⇨ Right side of the heart: comprises right atrium and right ventricle. Right atrium will receive the deoxygenated blood from superior *vena cava* and inferior *vena cava* and send the blood to right ventricle. Right ventricle sends the deoxygenated blood to pulmonary trunk to lungs for oxygenation of blood.

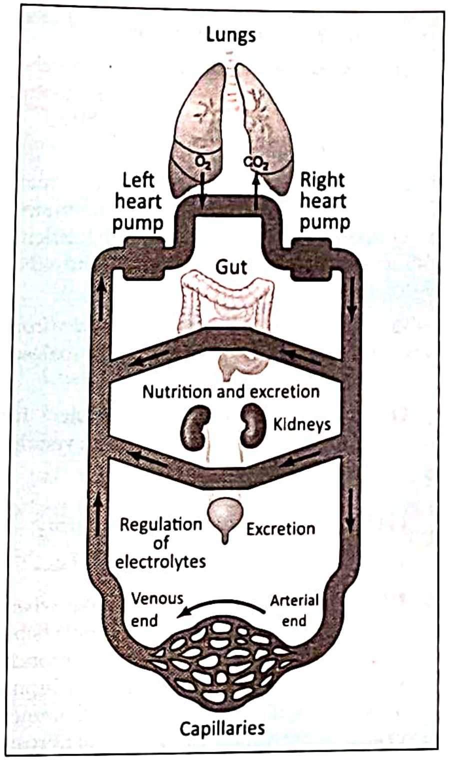

Fig 12.5: Cardiovascular system

⇨ Left side of the heart: comprises left atrium and left ventricle. Left atrium will receive

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hypoperfusion.

[27] This is attributable to cerebral hypoperfusion. This is leading to the manifestation of episode of syncope.

[28] This type of clinical presentation is observed when the person is having cerebral hypoperfusion in the region of basal ganglia or midbrain or cerebellum. This is especially seen when the person is having reduced cardiac output.

[29] This is attributable to profuse fluid or blood loss where the person is prone to have deprived blood supply to either brain or heart leading to sudden death.

[30] The nasal turbulence mechanism for removing the dust particles is so effective that no particles larger than 6 micrometers in diameter enter the lungs through nose. This size is smaller than the size of RBCs. The larger particles of dust can be seen in the patients who are mouth breathers.

[31] Approximately 65,000 parallel terminal bronchioles are present through which only a minute amount of air passes. In disease conditions, these bronchioles play a greater role in determining the airflow because of their smaller size. These bronchioles are easily occluded by
1. muscle contraction in their walls
2. oedema occurring in the walls
3. presence of mucus plug in the lumen of bronchioles

[32] Pulmonary ventilation is regulated by two main muscles namely diaphragm and external intercostal muscles. The other muscles which may help during breathing difficulty are sternocleidomastoid muscles, serratus anterior and scaleni muscles.

[33] Other factors that affect the respiration are voluntary control of respiration, presence of irritants in the airways, depression of respiratory centre and in case of overdosage of anaesthetic drugs that depress the respiratory centre.

[34] Among the blood in the circulatory system, 84% of the entire blood in general circulation and 16% in heart and lungs. Of 84% in systemic circulation, 64% is in veins, 13% in arteries and 7% in systemic arterioles and capillaries. Among the pulmonary circulation, 7% of the blood present in heart and 9% present in pulmonary vessels.

[35] The overall blood flow in the total circulation of an adult person at rest is about 5,000 ml/ minute. This is called cardiac output. It is the amount of blood pumped into aorta by the heart each minute.

the oxygenated blood from pulmonary capillaries in the lungs to left ventricle. Left ventricle sends the oxygenated blood to aorta for general circulation.

Blood vessels:

- ☐ **Arteries:** transport the blood under high pressure to the tissues.
- ☐ **Arterioles:** are the last small branches of arterial system, act as control conduits through which blood is released into the capillaries.
- ☐ Capillaries:[36] where the main function[37] of cardiovascular system occurs i.e. exchange of fluid, nutrients and metabolites, hormones and other substances occurs
- ☐ **Venules:** collect the blood from capillaries and they gradually coalesce into larger veins
- ☐ **Veins:** function as conduits for transport system of blood from venules back to the heart.

Cardiovascular system and respiratory system and important diseases

- ⇨ **Bronchiectasis** – this is a disease where there is permanent and irreversible dilatation of segment of larger bronchi will be present. This is caused by chronic infection and inflammation. Common causes of bronchiectasis are cystic fibrosis, recurrent infections and in some cases, idiopathic cause. This is characterised by chronic cough with copious amount of purulent sputum. This is worsened by change of posture. Some patients may also have fever and breathlessness.
- ⇨ **COPD** – this is a spectrum of diseases where partially reversible airflow limitation caused by inflammatory response to inhaled toxins, often cigarette smoking. This is charactered by cough with expectoration and breathlessness that develop over years. Common signs include decreased breath sounds, prolonged expiratory phase of respiration and wheezing. In severe cases, there will be complications such as weight loss, pneumothorax, right sided heart failure, acute or chronic respiratory failure. On examination, barrel shaped or emphysematous chest, pursed lip breathing, effortful breathing, absent apex impulse, diminished liver and cardiac dullness on percussion are seen. Diagnosis is based on history, physical examination, chest X ray and pulmonary function tests.
- ⇨ **Bronchial asthma** – bronchial asthma is a disease of diffuse airway inflammation caused by a variety of triggering stimuli resulting in partially or completely reversible bronchoconstriction. This is characterised by breathlessness, chest tightness, cough and wheezing. The diagnosis is based on history, physical examination and pulmonary function tests.
- ⇨ **Congestive cardiac failure** – this is syndrome of ventricular dysfunction. It may be either forward failure or backward failure. Left ventricular failure is presented with cough with pink frothy sputum, exertional dyspnoea, paroxysmal nocturnal dyspnoea, orthopnoea, Cheyne stokes respiration and syncopal attack, oliguria and nocturia. Right sided heart failure is presented with pain in the right upper quadrant, bilateral pedal oedema, loss of appetite, nausea or vomiting, ascites, bleeding per rectum. Diagnosis is made by careful history, physical examination supported by chest x ray, electrocardiogram and echocardiogram.

G K

[36] The blood flow through each capillary is intermittent. The rate of movement in capillaries is about 0.3mm/second.

[37] Principal function of circulatory system occurs in capillaries and it is mediated by Sterling forces. Sterling forces are the pressure gradients happen across the capillary membranes due to the presence of water, proteins and electrolytes. Sterling forces include hydrostatic pressure and osmotic pressure which occurs at capillary membrane and interstitial space.

- ⇨ **Acute coronary syndrome** – this results from acute obstruction of coronary artery. Consequences depend upon degree and location of obstruction and range from unstable angina to myocardial infarction and sudden cardiac death. The symptoms are chest discomfort in retrosternal region with or without dyspnoea, nausea and sweating. Diagnosis is by electrocardiogram and presence or absence of cardiac enzymes.
- ⇨ **Angina pectoris** – it is a clinical syndrome of precordial chest discomfort or pressure due to transient myocardial ischemia without infarction. It is precipitated by exertion or psychological stress and relieved by rest or sublingual nitroglycerin. Diagnosis is done by clinical history, electrocardiogram and myocardial imaging.

Udakavaha Srotas

Udakavaha Srotomula

उदकवहानां स्त्रोतसां तालुमूलं क्लोम च॥ च.वि. - 5/8
उदकवहे द्वे, तयोर्मूलं तालु क्लोमं च॥ सु.शा. - 9/12

Udakavaha Srotas are the channels which carry or control the movement of water inside the body tissues i.e. in alimentary canal, intra vascular compartment (blood vessels), interstitial compartment and intracellular compartment (inside the cells). As per *Caraka*, the sites of origin (*Mula*) of *Udakavaha Srotas* are *Talu* (palate) and *Kloma* (pancreas). As per *Sushruta*, the *Udakavaha Srotas* are two in number and the sites of origin are same as that of description of *Caraka*.

Srotodushti Karana

औष्ण्यादामाद्भयात् पानादतिशुष्कान्नसेवनात्।
अम्बुवाहीनि दुष्यन्ति तृष्णायाश्चातिपीडनात्॥1 1॥
Ca.Vi. – 5/11

- ⇨ *Oushnya* (increase of *Ushna Guna* in the body either due to consumption of substances which has the property of *Pitta* vitiation or due to exposure to sunlight)[38]
- ⇨ *Ama* (the presence of *Ama* in *Mahasrotas*[39] [alimentary canal] or *Dhatu* [body tissue] level)
- ⇨ *Bhaya* (fear)[40]
- ⇨ *Pana* (excess consumption of liquids[41] such as water, intoxicating substances etc);
- ⇨ *Atishushkanna Sevana* (excess consumption of substances which are dry[42] in nature such as bitten rice)
- ⇨ *Trishna Atipeedana* (if the person is suffering from excessive thirst or frequent thirst)[43]

G K

[38] This will reduce the transfer of heat generated in the body to the exterior. This is responsible for
1. Increased basal metabolism in all the cells of the body
2. Extra metabolism caused by increased chemical activity in the cells, especially the temperature of the cell increases

[39] The presence of *Ama* in the alimentary canal diminishes the absorption of water, electrolytes and other nutrients from the alimentary mucosa. It is being observed that nearly around 9,200 ml of water will be present in alimentary canal and 9,000 ml of fluid and electrolyte portion is absorbed at various levels of alimentary canal. Thus, the person will have hypovolemia and thus, the person may present with thirst.

[40] Exposure to fear is responsible for the excitation of adrenal medullae and thereby stimulating the sympathetic nervous system. This is leading to the constriction of all blood vessels of the body, inhibition of secretion of glands of gastro intestinal tract.

[41] It is being observed that when the person drinks water, it takes 30 – 60 minutes to be absorbed from the alimentary canal. If the thirst sensation is not relieved after drinking water, the person would continue drink water more and more consequently resulting in overhydration and excess dilution of body fluid.

[42] This is responsible for the stimulation of parasympathetic nervous system. As discussed earlier, parasympathetic nervous system stimulation in the gastro intestinal tract leads to the increased secretion of digestive juices to facilitate digestion and parasympathetic nervous stimulation in the bronchioles of respiratory tract leading to broncho constriction.

[43] The presence of thirst indirectly makes one to infer that the person is having decrease in extracellular

Srotodushti Lakshana of Udakavaha Srotas

प्रदुष्टानां तु खल्वेषामिदं विशेषविज्ञानं भवति तद्यथा
जिह्वाताल्वोष्ठकण्ठक्लोमशोषं पिपासां चातिप्रवृद्धां
दृष्टोदकवहान्यस्य स्रोतांसि प्रदुष्टानीति विद्यात्॥
च.वि. 5/8

- *Jihva Shosha* – dryness of tongue[44]
- *Talu Shosha* – dryness of palate
- *Oshtha Shosha* – dryness of lips
- *Kantha Shosha* – dryness of throat
- *Kloma Shosha* – dryness of kloma or site of development of thirst)
- *Atipravriddha Pipasa* (excess thirst)

Viddha Lakshana of Udakavaha Srotas

तत्र विद्धस्य पिपासा सद्योमरणं च॥ सु.शा. 9/12

- *Pipasa* (thirst)[45]
- *Sadyomarana* (sudden death)[46]

Internal environment

The term internal environment or milieu interieur is coined by Claude Bernarde in 1949. In this, the interstitial fluid bathes the cells and plasma, together maintain the normal morphology and functions of the cells and tissues of the body.

The mechanism by which the constancy of internal environment is maintained is called homeostasis.

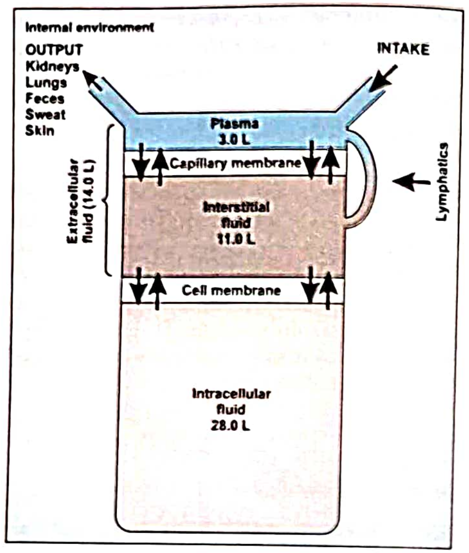

Fig 12.6: Internal environment

Water and electrolytes are considered to be two major constituents of internal environment.

Water[47] is considered to be the principal and essential constituent of the body. The total body water in a normal adult male comprises 50-70% (average 60%) of the body weight and about 10% less (average 50%) in a normal adult female. Thus, the body of a normal male weighing 65 kg contains approximately 40 liters of water.

The total body water is distributed in two main compartments of the body fluids separated from each other by membranes freely permeable to water.

- **Intracellular compartment–** comprises about 33% of the body weight, the bulk of which is contained in muscles
- **Extracellular compartment–** constitutes remaining 27% of the water.
  - ☐ Interstitial fluid including lymph, major proportion of ECF (12% of body weight)
  - ☐ Intravascular compartment or blood plasma (5% of the body weight). Plasma content is about 3 liters of fluid out of 5 liters of total blood volume
  - ☐ Mesenchymal tissue fluid such as dense connective tissue, cartilage and bone (9% of the body weight)
  - ☐ Transcellular fluid compartment – fluid present in secretions of secretory cells of the body e.g. skin, salivary glands, mucous membranes of alimentary tract, respiratory tract, kidneys, gonads, thyroid gland, lacrimal gland and CSF (1% of the body weight)

Electrolytes: Electrolytes are major components of internal environment. In intracellular and extracellular components, different concentrations of electrolytes are found.

- In intracellular fluid (ICF), main cations are potassium and magnesium ions and main anions present are phosphates and proteins. It has low concentrations of sodium and chloride.
- In extracellular fluid (ECF), predominant cation is sodium and principal anions are chloride and bicarbonate.
- The major functions of electrolytes are
  - ☐ Main solutes in the body fluids responsible for acid base equilibrium
  - ☐ Maintain the proper volume of body fluids

Normal water and electrolyte balance (Gibbs Donnan equilibrium)

Normally a state of balance exists between the amount of water absorbed into the body and that which is eliminated from the body. The water as well as electrolytes are distributed nearly constantly in different body fluid compartemnts:

1. Water is normally absorbed into the body from the bowel or introduced parenterally; average intake being 2,800 ml/ day
2. Water is eliminated from the body via
   - Kidneys in the form of urine (average 1,500 ml/ day)
   - Skin as insensible loss in perspiration or as sweat (average 800 ml/ day), though there is wide variation in loss via sweat depending upon weather, temperature, fever and exercise
   - Lungs in exhaled air (400 ml/day)
   - Minor losses via faeces (100 ml/ day) and lacrimal, nasal, oral, sexual and mammary secretions

Regulation of water balance in the body

- **Thirst centre:** Anterolateral wall of the third ventricle which promotes ADH release also stiumulates thirst.[48] There is another small area located in preoptic

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fluid volume and decrease in arterial pressure.
After a person drinks water, it takes 30 to 60 minutes for the water to be absorbed and distributed throughout the body. That is the reason, the person will feel thirst till this absorption occurs.

[44] Dryness of the tongue, palate, lips, throat and the presence of thirst signals the state of hypovolemia. It means the reduced volume of the fluid portion in the blood. This is caused due to either
1. Reduction in the fluid portion from the extra cellular compartmemnt
2. Circulatory shock with or without reduced cardiac output
3. Conditions which lead to either reduced fluid intake or excess fluid loss from the body

[45] Mechanism of thirst is occurring by
1. Decreases in extracellular fluid volume
2. Decreases in arterial pressure
3. Elevation in Angiotensin II which usually occurs because of hypovolemia
4. Dryness of mouth and mucous membranes of oesophagus
5. Gastrointestinal and pharyngeal stimuli

[46] This is occurring due to the circulatory shock due to hypovolemia. The mechanism is being described in the context of shock.

[47]

(a) Extra cellular fluid	Volume 14 liters
(b) Intra cellular fluid	Volume 28 liters
(c) Total body fluid	Volume 42 liters

[48] Causes of thirst:
1. Decrease in ECF and arterial pressure, E.g. blood loss through haemorrhage stimulates thirst even though there is no change in osmolarity.
2. Angiotensin II release
3. Dryness of mouth and mucous membranes of the oesophagus

nucleus causes immediate drinking that continues as long as the stimulation lasts. All these areas together are termed as thirst centre. Decreased water content gives the stumulus to thirst centre.

⇨ **Mechanism of thirst:**

- ☐ First, due to various reasons, there will be reduction in ECF, there will be increase of osmolarity of ECF.
- ☐ This will be responsible for the decrease of blood pressure and increase of Angiotensin and angiotensin is one of the powerful stimulator of aldosterone hormone
- ☐ This is clinically identified by dryness of mouth.
- ☐ When the osmolarity increases by 1 – 2 %, the osmoreceptors are stimulated.
- ☐ Osmoreceptors in turn activate the thirst center leading to the thirst sensation and makes the person to drink water[49].

ADH Mechanism

⇨ When the volume of ECF decreases with increased osmolarity, the supra optic nucleus is stimulated and ADH is released.

⇨ ADH causes retention of water by facultative reabsorption in the renal tubules. It increases the ECF volume and brings the osmolarity to normal level.

Aldosterone: When there is reduced ECF, there will be stimulation of aldosterone which further responsible for the reabsorption of sodium ions and secretion of potassium ions and hydrogen ions. This is responsible for the increase of ECF.

Pancreas: Pancreas is an organ having exocrine and endocrine function. It is made up of small clusters of glandular epithelial cells. 99% of the cluster called acini constitute the exocrine portion of the organ which secrete pancreatic juice and 1% of the cluster called islets of Langerhans secrete insulin, glucagon, stomatostatin and pancreatic polypeptide. Among these hormones, insulin is the only antidiabetic hormone of the body.

⇨ Insulin[50] decreases blood glucose level and glucagon increases blood glucose level.

What do you mean by *Talu* and *Kloma*?

Talu can be considered as palate because the description of structure of Talu resembles to palate exactly. But *Kloma* is the very controversial organ. By looking into various references, we can say Kloma as pancreas.

⇨ As per *Caraka, Vagbhata, Bhela* and *Kashyapa, Kloma* is considered as *Koshthanga, therefore* 'it should be found in trunk that it is present in thoracic cavity or abdominal cavity. By this, we can say that *Kloma* is not present in head and neck region.

⇨ **Classical references of *Kloma*:**

तस्य वामपार्श्वे प्लीहा फुफ्फुसश्च दक्षिणतो यकृत् क्लोम च॥28॥ A.S.Sha. – 5/28

- ☐ *Ashtanga Sangraha* tells *Hridaya* arises from *Prasada* portion of *Rakta*. In left lateral side of *Hridaya, Pliha* and *Phupphusa* are present and in the right side, there will be *Yakrit* and *Kloma*.

दतस्याधो वामतः प्लीहा फुफ्फुसश्च, दक्षिणतो यकृत् क्लोम च। S.Sha. – 4/31

- ☐ As per *Sushruta*, the below the *Hridaya*, on the left side, *Pliha* and *Phupphusa* are present and on the right side, *Yakrit* and *Kloma* are located.

दक्लोम कालखण्डादधस्तात् स्थितं दक्षिणपार्श्वस्थं तिलकं प्रसिद्धम्। Su.Ni. – 9/15, Dalhana

- ☐ *Kloma* is one which is present below *Yakrit* and which has the shape of *Tila* and it is situated on the right side below *Hridaya*.
- ☐ By the above said references, we can come to conclusion that *Kloma* is a abdominal organ present or right side and it is nothing but pancreas.

Annavaha Srotas

Srotomula of Annavaha Srotas:

अन्नवहानां स्त्रोतसामामाशयो मूलं वामं च पार्श्वं। च.वि.5/8

अन्नवहे द्वे, तयोर्मूलमामाशयोऽन्नवाहिन्यश्च धमन्यः॥ सु. शा. 9/12

The sites of origin of *Annavaha Srotas* as per *Caraka* are *Amashaya* (stomach) and *Vama Parshva* (left side of the body). Whereas as per *Sushruta, Annavaha Srotas* are two in number and the sites of origin of *Annavaha Srotas* are *Amashaya* (stomach) and *Annavahi Dhamani* (channels which carry *Anna*).

Causes of vitiation of Annavaha Srotas

अतिमात्रस्य चाकाले चाहितस्य च भोजनात्।
अन्नवाहीनि दुष्यन्ति वैगुण्यात् पावकस्य च॥ [illegible]॥ Ca.Vi. – [illegible]/12

⇨ *Atimatra Bhojana* (consumption of food in excess quantity)[51]

⇨ *Akala Bhojana* (consumption of food at improper time either prior to the digestion of previously ingested food or consumption of food after the routine time of consumption of food)[52]

⇨ *Ahita Bhojana* (consumption of functioning of Agni or digestive fire)[53]unwholesome food[54] such as consumption of fish and milk) *Pavakasya Vaigunya* (improper

Symptoms[55] showing the vitiation of Annavaha Srotas

प्रदुष्टानां तु खल्वेषामिदं विशेष विज्ञानं भवति तद्यथा अनन्नाभिलाषामरोचकमविपाकौ छर्दिं च दृष्ट्वा अन्नवहान्यस्य स्त्रोतांसि प्रदुष्टानीति विद्यात्॥ च.वि. - 5/8

⇨ *Ananna Abhilashana* (aversion to take food)

⇨ *Arochaka* (tastelessness)

⇨ *Avipaka* (incomplete digestion)

⇨ *Chardi* (vomiting)

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4. Excess consumption of salt where in decreased ECF sodium concentration and decreased blood volume will be present
5. Irritating stimuli from gastro intestinal tract and pharynx

[49] When the person drinks water, 30 to 60 minutes may be required for the water to be reabsorbed and distributed throughout the body. If the thirst is not temporarily relieved after drinking water, the person consumes more and more water, thereby leading to the overhydration and excess dilution of body fluids.

[50] Lack of insulin in the body is responsible for the raise of blood glucose in the body. This is responsible for the severe dehydration of the body due to polyuria, intracellular and extracellular dehydration and thirst.

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[51] Consumption of excess food is responsible for the filling of gastro intetstinal tract, stomach and duodenum in particular and this is responsible for stretch inhibitory signals which are transmitted mainly by way of vagus nerve to suppress the feeding centre, thus reducing the desire to take food.

1. The factors such as chewing, salivation, swallowing and tasting the food etc meter the food as it passes through mouth and after a certain amount has passed, this is responsible for the inhibition of hypothalamic feeding centre. This usually lasts for 20 to 40 minutes.

[52] Consumption of food at improper time will lead to secretion of digestive juices necessary for the digestion of food at improper time and complete digestion of the food cannot be ensued as quantity, nature of food etc play a major role in the determination of digestion of food in such situations.

[53] Inside the stomach, there are two types of muscular contractions observed, first one is peristaltic contractions and second type of contractions are termed as hunger contractions. Hunger contractions are rhythmical peristaltic contractions in the body of the stomach. When, successive contractions become extremely strong, they often fuse to cause a strong tetanic contractions which sometimes last for 2 to 3 minutes.

When hunger contractions are active, the person will have mild abdominal pain and this is termed as hunger pangs. Hunger pangs do not begin 12 – 24 hours after the last ingestion of food; in starvation, they reach their greatest intensity in 3 to 4 days and later gradually weaken in successive days. This shows the improper function of digestive fire if proper care is not given.

[54] Consumption of unwholesome food is responsible for inflammation of alimentary canal there by digestion of food substances will be disturbed.

[55] The clinical features described in the *Annavaha Srotas* will be observed in cases of disturbances of salivary glands, oesophagus, stomach duodenum and jejunum.

Symptoms showing the injury to Annavaha Srotas

तत्र विद्धस्याध्मानं शूलान्नद्वेषौ पिपासान्ध्यं मरणं वा .....॥

सु.शा. - 9/12

- ⇨ *Adhmana* (fullness of the abdomen)[56]
- ⇨ *Sula* (pain in abdominal region)[57]
- ⇨ *Annadvesha* (aversion to food intake)
- ⇨ *Chardi* (vomiting)[58]
- ⇨ *Pipasa* (thirst)[59]
- ⇨ *Andhatva* (blindness)[60]
- ⇨ *Marana* (death)[61]

As per the descriptions, *Annavaha Srotas*[62] is having the function of accumulation of ingested food for certain time period and after the digestion and assimilation of nutrients, transport of food residue to the distal portion of alimentary canal. By the above description, we can infer the extent of *Annavaha Srotas* is from stomach to ileocaecal junction.

Stomach

- ⇨ A muscular bag forming the widest and most distensible part of the alimentary canal
- ⇨ This is connected proximally with lower end of oesophagus and distally with duodenum.
- ⇨ Acts as a reservoir of food and helps in the digestion of carbohydrates, proteins and fats.
- ⇨ This lies obliquely in upper and left part of the abdomen and occupying epigastric, umbilical and left hypochondriac regions.
- ⇨ J shaped organ during empty situation, attains pyriform shape during partial distension 25 cms long
- ⇨ At birth, it has a capacity of 30 ml and during adulthood, it has a capacity of 800 ml to 1500 ml
- ⇨ Has layers of serous layer, muscular layer, submucosal layer and mucosal layer from external to internal side
- ⇨ Contain following types of glands
  - ☐ **Oxyntic glands** – present in 80% of the inner surfaces of stomach, secrete HCl, pepsinogen, intrinsic factor and mucus
  - ☐ **Pyloric glands** – present in 20% of the inner surface of stomach, secrete mainly mucus and a hormone called gastrin
- ⇨ HCl of the gastric juice helps in activating the pepsinogen to pepsin, kills some of the bacteria entering the stomach; helps in digestion of food substances

Vama Parshva

- ⇨ *Vama Parshva* refers to the attainment of left lateral position. It is not a particular part of the body. When the person consumes the food substances, the person has to take rest left lateral position. As the greater curvature of the stomach is towards the left side, ample time will be taken for the proper mixture of gastric juice and ingested food.

Common diseases afflicting alimentary anal

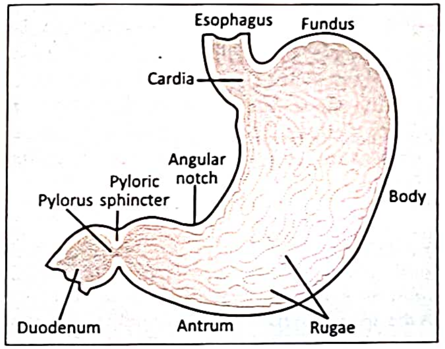

Fig 12.7: Stomach

- ⇨ **Reflux oesophagitis–** this is characterised by reverse peristaltic movement or reflux of gastric contents into lower oesophagus, in obesity, in third trimester of pregnancy, raised intra abdominal pressure or herniation of stomach into oesophageal hiatus. The main clinical features observed are heartburn on stooping or lying and regurgitation of bitter fluid. This may also be associated with pain during swallowing.
- ⇨ **Gastritis–** acute gastritis is the inflammation of gastric mucosa. This usually occurs due to the consumption of alcohol or anti-inflammatory agents such as aspirin. This may also be associated with gastrointestinal bleeding. The main clinical presentations of this disease are pain in the epigastrium, vomiting, worsening of the pain abdomen on immediately consumption of food.
- ⇨ **Peptic ulcer disease–** this is associated with discontinuity in the mucosa of the alimentary canal either stomach or duodenum. This can also occur in oesophagus or jejunum. Cardinal feature of this disease is burning sensation in the epigastric region. In gastric ulcer, the person will be developing the burning sensation in the epigastric region soon after consumption of food and in case of duodenal ulcer, the pain will be relieved after the consumption of food.

Rasavaha Srotas

Srotomula of Rasavaha Srotas

रसवहानां स्रोतसां हृदयं मूलं दश च धमन्यः।

च.वि. - 5/8

रसवहे द्वे, तयोर्मूलं हृदयं रसवाहिन्यश्च धमन्यः॥

सु. शा. 9/12

The sites of origin of *Rasavaha Srotas* as per *Caraka* are *Hridaya* (heart) and *Dasha Dhamani* (ten channels). As per *Sushruta, Rasavaha Srotas* are two in number and the sites of origin are *Hridaya* (heart) and *Rasavahi Dhamani* (channels carrying *Rasa*).

Causes of vitiation of Rasavaha Srotas:

गुरुशीतमतिस्निग्धमतिमात्रं समश्नताम्।
रसवाहीनि दुष्यन्ति चिन्त्यानां चातिचिन्तनात्॥3॥

Ca.Vi. – 5/13

- ⇨ *Guru Bhojana* (consumption of food which are heavy for digestion such as Masha) is responsible for the increase of Guru quality in the body thereby leading to the increase of *Kapha Dosha*, which further leads to the abnormality of *Rasa Dhatu* in the body.
- ⇨ *Shita Bhojana* (consumption of substances which are *Sita* or cold in nature) is

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[56] This can be attributable to the features of paralytic ileus or intestinal obstruction. Paralytic ileus is the temporary arrest of intestinal peristalsis. This occurs when intestines are manipulated during surgery. The clinical features include nausea, vomiting and vague abdominal discomfort. Intestinal obstruction is significant mechanical impairment or complete arrest of passage of contents of alimentary canal through intestine. This is characterised by cramping pain, vomiting, obstipation (absolute constipation) and lack of flatus.

[57] Refer description of *Adhmana* for this presenting complaint.

[58] Refer description of *Adhmana* for this presenting complaint.

[59] Refer the mechanism of thirst for this presenting complaint.

[60] This can be attributable to hypovolemic shock which manifests as a consequence of massive gastrointestinal haemorrhage. This is associated with tachycardia, tachypnoea and cerebral hypoperfusion. The patient may become unstable even at supine position, oliguria and mental confusion.

[61] This manifests as a consequence of massive gastrointestinal haemorrhage.

[62] Alimentary canal is mainly compartmentalised into several segments depending upon the sphincters present at different levels. The sphincters present in alimentary canal are upper oesophageal sphincter, lower oesophageal sphincter, pyloric antrum, ileo caecal junction and anal sphincter. If we categorise the functions of the Srotas, the functions from mouth to lower oesophageal sphincter is related to the function of *Pranavaha Srotas*; the functions from distal part of lower oesophageal sphincter upto the ileo caecal junction is related to the function of *Annavaha Srotas* and the functions from distal part of ileo caecal junction upto the anal sphincter is related to the function of *Purishavaha Srotas*.

responsible for the increase of *Shita* quality in the body and thereby leading to the increase of *Kapha Dosha*, which further leads to the vitiation of *Rasa Dhatu* in the body.

- ⇨ ***Atisnigdha Bhojana*** (consumption of food substances which are unctuous in nature such as Rasagulla, *Champakali* etc) is leading to the increase of *Snigdha Guna* in the body and thereby leading to the vitiation of *Kapha Dosha* as well as abnormal increase of *Rasa Dhatu* in the body.
- ⇨ ***Chintyanam Atichintana*** (excessive thinking)[63]

Symptoms of Rasavaha Srotas affliction[64]

अश्रद्दा चारुचिश्चास्यवैरस्यमरसज्ञता।
हल्लासो गौरवं तन्द्रा साङ्गमदी ज्वरस्तमः॥
पाण्डुत्वं स्रोतसां रोधः क्लैब्यं सादः कृशाङ्गता।
नाशोऽग्नेरयथाकालं वलयः पलितानि च॥
रसप्रदोषजा रोगा ......। च.सू. - 28/9-11

- ⇨ *Asraddha* (though the person takes food, one will not be having any craving for food);
- ⇨ *Aruchi* (the person will not take food or there will be tastelessness)[65];
- ⇨ *Asyavairasya* (the person will be having perception of improper taste);
- ⇨ *Arasajnata* (the person will not be having perception of taste);
- ⇨ *Hrillasa* (nausea)[66];
- ⇨ *Gourava* (heaviness of the body)[67];
- ⇨ *Tandra* (drousiness)[68];
- ⇨ *Sangamarda* (pain all over the body or myalgia);
- ⇨ *Jvara* (raised body temperature)[69];
- ⇨ *Tama* (blackout or darkness in front of the eyes)[70] –
- ⇨ *Pandutva* (yellowish white discolouration of body or anemia) – this symptom is attributable to the abnormality of *Rasa Dhatu* not *Rakta Dhatu Kshaya*. Here, there will be the deficiency in the formation of *Rakta Poshaka Bhaga* (part of the tissue present in the *Rasa* which nourishes *Rakta Dhatu*).

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63 Thinking is a very complex process involving the co-ordinated functions of many portions of cerebral cortex, thalamus, limbic system and reticular formation of the brain and certain lower centres. It involves sorting out the many of the sensations – pain, temperature, pressure, special senses etc. In other words to say, millions of the informations are carried out across the nervous system in case of thinking process. It involves spending of huge amount of nutrients from the body in case of excessive thinking. Thus, the person may suffer from nutrition loss in case of excessive thinking as the person may have deficit of input when compared to excess of expenditure of energy.

64 Refer the descriptions of *Rasa Vriddhi* and *Kshaya Lakshana* in the present textbook.

65 Refer the context of *Arochaka* described in the context of *Rasa Vriddhi Lakshana* in the present textbook. *Ashraddha*, *Asyavairasya* and *Arasajnata* can also be understood in these lines. If we analyse the commentary of *Chakrapani Datta*, there are minor differences for these terms. Learn the concepts in original commentary of *Charaka Samhita* written by *Chakrapani Datta*.

66 Refer the context of *Hrillasa* described in the context of *Rasa Vriddhi* in the present textbook.

67 Refer the context *Gourava* described in the context of *Rasa Vriddhi* to understand this concept in the present textbook.

68 When the person is having drousiness, there will be activation of parasympathetic nervous system. This means there will be reduced blood supply to the central nervous system occurs and more blood supply to the alimentary canal is seen that means channelization of blood from the central nervous system to alimentary canal to facilitate the digestion and absorption of ingested food occurs.

69 Refer the context of mechanism of fever explained in *Svedavaha Srotas* in the context of mechanism of sweating.

70 This is attributable to hypovolemia

- ⇨ ***Sroto Rodha*** (obstruction in *Srotas*)[71];
- ⇨ ***Klaibya*** (inability to perform sexual activity or impotence or erectile dysfunction) – this symptom is suggestive of the abnormality of *Rasa* as well as *Shukra Dhatu*. The association of the other symptoms gives the inference regarding the affliction of *Rasa* or *Shukra* or both the *Dhatu*.
- ⇨ ***Sada*** (reduced activity of body parts)[72];
- ⇨ ***Krishangata*** (emaciation of the body)[73];
- ⇨ ***Agninasha*** (decreased function of digestive fire)[74];
- ⇨ ***Vali*** **and** ***Palita*** in *Ayathakala* (premature development of wrinkles and greying of scalp hair)

Symptoms of injury to Rasavaha Srotas

तत्र विद्धस्य शोषः प्राणवह विद्धवच्च मरणं तल्लिङ्गानि च॥ सु.शा. - 9/12

- ⇨ *Sosha* (dryness of the body parts)[75];
- ⇨ Similar *Lakshana* observed when there will be injury to *Pranavaha Srotas* such as
  - ☐ *Akroshana* (crying with loud sound)[76],
  - ☐ *Vinamana* (bending forwards)[77],
  - ☐ *Mohana* (altered state of consciousness)[78],
  - ☐ *Bhramana* (giddiness)[79],
  - ☐ *Vepana* (involuntary movements)[80] and
  - ☐ *Marana* (death)[81]
- ⇨ Lymphatic system represents an accessory route through which fluid can flow from interstitial spaces to the intravascular compartment.
- ⇨ Lymphatics carry proteins and large particulate matter away from the tissue spaces, as these particles cannot be taken into general circulation through veins.
- ⇨ Lymph[82] from left side of the head, left arm, left part of the chest, abdomen and both lower limbs enters the thoracic duct[83] before entering into general circulation

Lymphatic system

- ⇨ Lymph from right side of the head, right arm, right part of the chest enters the right lymphatic duct before entering the general circulation.

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71 Refer the context of *Srotorodha* described in the context of *Rasa Vriddhi Lakshana* to understand this concept in the present textbook.

72 This is usually occurring as a result of *Gaurava* and *Alasya* which is association of *Gaurava*.

73 This is attributable to malabsorption.

74 Refer the context of *Agnisadana* described in the context of *Rasa Vriddhi Lakshana* in the present textbook.

75 Due to the gradual loss of the fluid from the body, there will be hypovolemia where in dryness of the skin and other structures is seen due to peripheral vasoconstriction.

76 This is attributable to severity of chest discomfort seen in the patients of myocardial infarction

77 When the person is bending forwards, this will lead to the relaxation of the muscles of the abdomen. Due to this, stretching of the chest will be reduced, thereby relief from chest discomfort can be seen in the patients.

78 This clinical feature is attributable to episode of syncope. Poor pumping activity of left ventricle will lead to syncopal attacks.

79 This clinical feature is attributable to syncopal episode.

80 The nature of involuntary movement in case of respiratory failure is irregular, coarse or flapping tremor. In the patient who is having either hyperventilation or panic attacks, there will be hypokalemia and this mechanism may be responsible for manifestation of tetany, where in involuntary movements are seen.

81 This can be attributable to sudden compromise in cardiac function. The modes of death in this occasion may be either asphyxia or syncope.

82 Total quantity of lymph formed in 24 hours is 2 to 3 liters. It is derived from interstitial fluid which flows into the lymphatics.

83 About 100 ml of lymph will flow through thoracic duct of a resting human being per hour.

- ⇨ Lymph composition[84] major composition of lymph is proteins and few concentrations of large particulate matter, some even larger particles such as bacteria. As far as proteins are concerned, lymph derived from interstitial fluid of most tissues averages about 2g/ dl; lymph formed in the liver has high concentration of protein of 3-4 g/ dl.

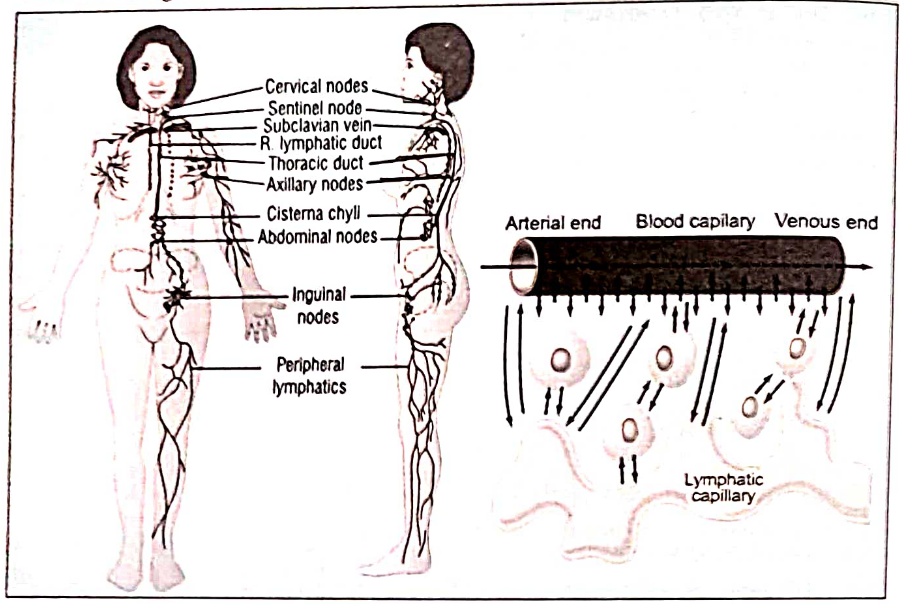

Fig 12.8: Lymphatic system

Raktavaha Srotas[85]

Raktavaha Srotomula:

रक्तवहानां स्रोतसां यकृन्मूलं प्लीहा च। च.वि. 5/8
रक्तवहे द्वे, तयोर्मूलं यकृत् प्लीहानौ रक्तवाहिन्यश्च धमन्यः॥ सु.शा. 9/12

As per *Caraka*, the sites of origin of *Raktavaha Srotas* are *Yakrit* (liver) and *Pliha* (spleen). As per *Sushruta*, the *Raktavaha Srotas* are two in number and their sites of origin are *Yakrit* (liver), *Pliha* (spleen) and *Raktavahi Dhamani* (channels which carry *Rakta*).

Causes of affliction of Raktavaha Srotas:

विदाहीन्यन्नपानानि स्निग्धोष्णानि द्रवाणि च।
रक्तवाहीनि दुष्यन्ति भजतां चातपानलौ॥।4॥

Ca.Vi. – 5/14

- ⇨ ***Vidahi Annapana***[86] (consumption of food and drinks which are causing Vidaha or burning sensation in the chest etc or excessive thirst) such as bakery items (bread, pizza, burger, chat items or gobi Manchurian etc) and batter prepared from black gram which is kept overnight for fermentation
- ⇨ ***Snigdha Bhojana*** (consumption of food which are unctuous in nature) will lead to the increase of *Snigdha Guna* in the body, thereby leading to the increase of *Pitta Dosha* in the body and thereby leading to the abnormal increase of *Rakta* in the body.
- ⇨ ***Ushna Bhojana*** (consumption of food which are having *Ushna Virya* in nature) such as foods prepared of *Sarshapa taila* (mustard oil) or chillies
- ⇨ ***Drava Bhojana*** (consumption of excess fluids) such as excess consumption of lemon juice or orange juice etc. This will lead to the increase of *Drava Guna*, thereby increasing the *Pitta* in the body and thereby leading to the enhancement of *Rakta* in the body.
- ⇨ ***Atapa Sevana*** (exposure to sunrays[87] for longer duration such as traffic policemen or farmers etc)
- ⇨ ***Anala Sevana*** (exposure to fire[88] such as train engine drivers where coal is used or cooks)

Symptoms of affliction of Raktavaha Srotas[89]

वक्ष्यन्ते रक्तप्रदोषजाः॥
कुष्ठवीसर्पपिडका रक्तपित्तमसृग्दरः।
गुदमेढ्रास्यपाकश्च प्लीहा गुल्मोऽथ विद्रधिः॥
नीलिका कामला व्यङ्गः पिप्लवस्तिलकालकाः।
दद्रुश्चर्मदलं श्वित्रं पामा कोठास्रमण्डलम्।
रक्तप्रदोषाज्जायन्ते ......॥ च.सू. -28/11-13

- ⇨ *Kushtha* (any skin disease)[90]
- ⇨ *Visarpa* (disease of the skin which spreads rapidly)[91];
- ⇨ *Pidaka* (boils or furuncles and carbuncle)[92];
- ⇨ *Raktapitta* (bleeding diathesis);
- ⇨ *Asrikdara* (excess menstrual flow);
- ⇨ *Gudapaka* (suppuration in anal region);
- ⇨ *Medhrapaka* (suppuration in the penis);
- ⇨ *Asyapaka* (suppuration in the oral cavity)[93];
- ⇨ *Pliharoga* (disease involving *Pliha* or spleen)[94];
- ⇨ *Gulma* (chronic abdominal swelling);

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84 Lymphatic flow is being affected by following mechanisms:
1. Elevated capillary pressure
2. Decreased plasma oncotic pressure
3. Increased interstitial fluid oncotic pressure
4. Increased permeability of capillaries
5. Contraction of surrounding skeletal muscles
6. Movement of parts of the body
7. Pulsation of arteries present adjacent to lymphatics
8. Compression of tissues outside the tissues by objects outside the body.

85 Structure of meseteric capillary bed, the diameter of the capillary is 4 to 9 micrometers and thickness of the capillary wall is 0.5 micrometer. Blood flow in the capillaries is not continuous, it is intermittent. That means the intermittent blood flow may be present for every few seconds to few minutes. The cause of such phenomena is due to the presence of metararterioles and pre capillary sphincters.

86 Any substances responsible for sour eructations, burning sensation in the chest and thirst and delayed digestion are termed as Vidahi substances. These are responsible for the vitiation of Pitta Dosha.

87 This is responsible for the peripheral vaso dilatation there by leading to the excess fluid and heat loss from the body due to the enhancement of heat inside the body.

88 This is also responsible for the peripheral vaso dilatation, leading to the excess fluid, salt and the person will be having prevention of heat loss from the body.

89 Also refer the description of *Rakta Vriddhi* and *Kshaya Lakshana* mentioned in the present textbook.

90 Refer the context of *Kushtha* explained in *Rakta Vriddhi Lakshana* in the present textbook.

91 Refer the context of Visarpa explained in the *Rakta Vriddhi Lakshana* in the present textbook

92 This is the clinical condition where we can observe the infection of hair follicle with staphylococcus aureus. This may be associated with perifolliculitis which may further progress into suppuration. Carbuncles are bigger form of boils and is caused by staphylococcus aureus.

93 Whenever, there is suppuration in the body, we can infer the involvement of *Rakta* in the body.

94 We can infer the involvement of *Pliha* as this is one of the *Srotomula* of *Raktavaha Srotas*, the other *Srotomula* is being *Yakrit*.

- ⇨ *Vidradhi* (abscess)[95];
- ⇨ Nilika (a type of Kshudra Roga);
- ⇨ Kamala (jaundice)[96];
- ⇨ Vyanga (a type of skin lesion involving cheeks in women nearing menopause);
- ⇨ Piplava (multiple freckles, marks or moles);
- ⇨ Tilakalaka (a mole having a size of Tila or sesamum seeds)[97];
- ⇨ Dadru (cutaneous eruption);
- ⇨ Charmadala (variant form of leprosy);
- ⇨ Svitra (vitiligo);
- ⇨ Pama (a kind of skin disease or eruption)[98];
- ⇨ Kotha (skin disease with round red spots or impetigo);
- ⇨ Asramandala (reddish round eruptions)

Symptoms of injury to Raktavaha Srotas

तत्र विद्धस्य श्यावाङ्गता ज्वरो दाहः पाण्डुता शोणितागमनं रक्तनेत्रता च॥

सु.शा. - 9/12

- ⇨ *Syavangata* (blackish discolouration of the injured body parts)[99];
- ⇨ *Jvara* (raised body temperature)[100];
- ⇨ *Daha* (burning sensation);
- ⇨ *Panduta* (yellowish white discolouration or anemia)[101];
- ⇨ *Sonitagamana* (bleeding either from injured area or from other parts)[102];
- ⇨ *Raktanetrata* (reddish discolouration of eyes)[103]

Haemopoietic system

Haemopoietic system comprises of blood cells and cells of macrophage system and lymphatic system.

a. **Red blood corpuscles:**[104] These are also known as erythrocytes, will transport haemoglobin across the body in the blood. These will carry oxygen from the lungs to the peripheral tissues and carbon dioxide from the peripheral tissues back to the lungs.

Genesis of blood cells[105]: The blood cells in the bone marrow start to be produced from pluripotent haemopoietic stem cell (PHSC), from which all the cells of the circulating blood are eventually derived.

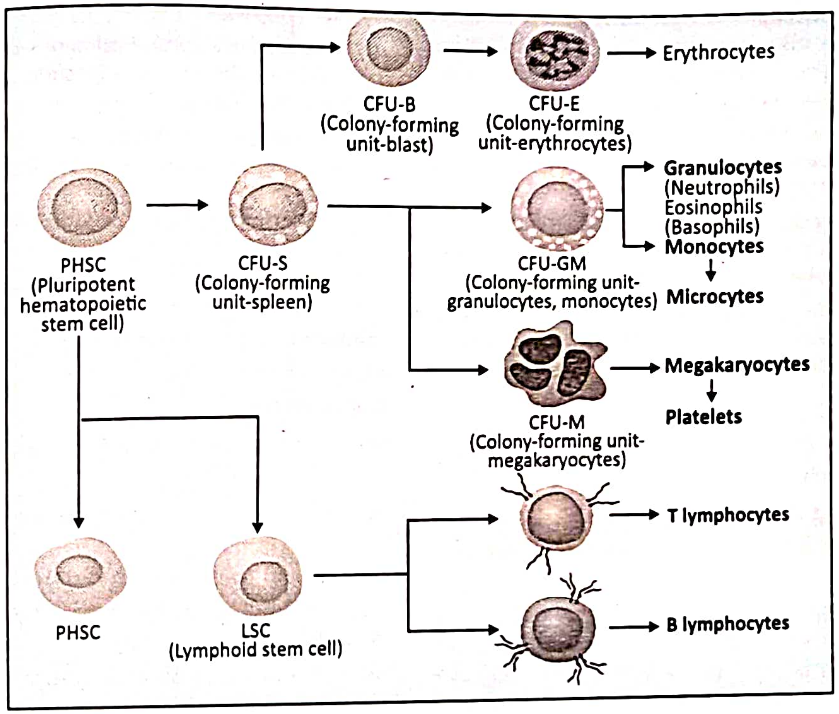
CFU-B
(Colony-forming unit-blast)
CFU-E
(Colony-forming unit-erythrocytes)
Erythrocytes
PHSC
(Pluripotent hematopoietic stem cell)
CFU-S
(Colony-forming unit-spleen)
CFU-GM
(Colony-forming unit-granulocytes, monocytes)
Granulocytes
(Neutrophils)
Eosinophils
(Basophils)
Monocytes
Microcytes
Megakaryocytes
Platelets
CFU-M
(Colony-forming unit-megakaryocytes)
T lymphocytes
B lymphocytes
PHSC
LSC
(Lymphoid stem cell)

Fig 12.9: Stages of differentiation of RBCs

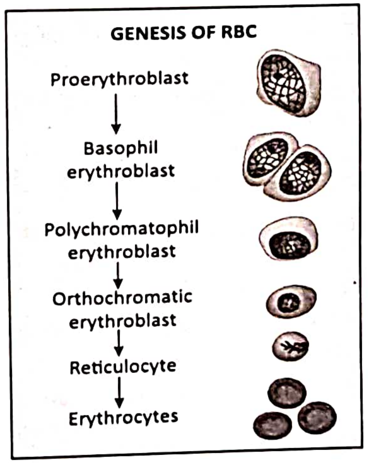
GENESIS OF RBC
Proerythroblast
Basophil erythroblast
Polychromatophil erythroblast
Orthochromatic erythroblast
Reticulocyte
Erythrocytes

Fig 12.10: Genesis of RBC

b. **White blood cells (WBCs)**

WBCs[106] are partially formed in the bone marrow (granulocytes and monocytes) and partially in the lymphoid tissue (lymphocytes and plasma cells). After formation, they are transported to different parts of the body in the blood where the need arises.

Six types of WBCs are present in the body. They are polymorphonuclear neutrophils, polymorphonuclear basophils, polymorphonuclear oesinophils, monocytes, lymphocytes and occasionally plasma cells.

- ⇨ **Neutrophils and macrophages** (developed phase of monocytes) will be helpful in defending the body against most of the infections through a process of phagocytosis.

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[95] Refer the context of *Vidradhi* explained in *Rakta Vriddhi Lakshana* in the present textbook.

[96] Refer the context of *Kamala* explained in the context of *Rakta Vriddhi Lakshana* in the present textbook.

[97] These are discolourations observed in different parts of the body of different size.

[98] These are the different varieties of *Kushtha*. As we stated earlier, whenever there is manifestation of the skin disease, we can infer the involvement of *Rakta Dhatu* in the body.

[99] This is especially seen in the extravasation of blood. This is seen in ecchymosis.

[100] Whenever there is trauma to the skin and there is discontinuity of the skin, microorganisms will enter the skin and produce infection. During the progression of infection, the person may be presented with raised body temperature.

[101] This is seen soon after the hemorrhage is seen.

[102] This is seen in conditions of acute hemorrhage. Bleeding can be observed in case of discontinuity of the skin.

[103] In case of fracture of anterior cranial fossa, few signs of hemorrhage are noted in the eye.
1. Ecchymosis due to extravasated blood around the eyes usually after 24 hours. It appears first in the lower eyelid and later in the upper eyelids.
2. Redness of the conjunctiva in case of subconjunctival hemorrhage is seen.

[104] Other functions of RBCs is to transport the hormones to the target tissues, to transport the nutrients absorbed from alimentary canal to different parts of the body, act as buffer in case of increased carbon dioxide level in the body.

[105] RBCs in the early weeks of embryonic life, primitive nucleated RBCs are produced in yolk sac of the embryo. In the middle trimester of gestation, liver is the main organ of RBC production, reasonably also produced by spleen and lymph nodes and during last month of gestation, and after birth, RBCs are exclusively produced from bone marrow.

[106] The real value of WBC is most of the cells will be transported to areas of serious infection and inflammation, there by providing the rapid and strong defence against infectious agents.

- **Eosinophils** are produced in large numbers in case of parasitic infections. It also has special affinity towards the peribronchial tissues in case of bronchial asthma.
- **Basophils** are in combating the immune reactions occur in the body due to allergic manifestation.
- **Lymphocytes** are helpful in developing acquired immunity in the body in enhancement of T cells.
- **Plasma** cells are helpful in the production of antibodies in the body by activation of B lymphocytes.

Mamsavaha Srotas

Srotomula of Mamsavaha Srotas[107]

मांसवहानां स्रोतसां स्नायुर्मूलं त्वक् च॥ च.वि. - 5/8

मांसवहे द्वे, तयोर्मूलं स्नायुत्वचं रक्तवहान्यश्च धमन्यः॥
सु.शा. - 9/12

As per *Caraka*, the sites of origin of *Mamsavaha Srotas* are *Snayu* (ligaments) and *Tvak* (skin). Whereas as per *Sushruta*, there are two *Mamsavaha Srotas* present and their sites of origin are *Snayu* (ligaments), *Tvak* (skin) and *Raktavahi Dhamani* (channels carrying *Rakta*).

अभिष्यन्दीनि भोज्यानि स्थूलानि च गुरूणि च।
मांसवाहीनि दुष्यन्ति भुक्त्वा च स्वपतां दिवा॥15॥
Ca.Vi. – 5/15

- ***Abhisyandi Bhojana*** (consumption of substances which increase *Kledatva* in the body such as curds, fish etc) which is responsible for the sluggish movements in the body;
- ***Sthula Bhojana*** (consumption of substances which are *Sthula* in nature either due to faulty preparation of food or due to improper chewing due to ill fitting dentures etc);
- ***Guru Bhojana*** (consumption of substances which are heavy for digestion such as blackgram items);
- ***Divasvapna*** after ***Bhojana*** (sleeping in day time soon after consumption of food)

Symptoms of affliction of Mamsavaha Srotas

श्रृणु मांसप्रदोषजान्।
अधिमांसार्बुदं कीलं गलशालूकशुण्डिके॥
पूतिमांसालजीगण्डगण्डमालोपजिह्विकाः।
विद्यान्मांसाश्रयान् ....। च.सू. - 28/13-14

- *Adhimamsa* (excess growth of muscles);
- *Arbuda* (neoplasms);
- *Kila* (a kind of tumour having the form of a stake);
- *Galashaluka* (a tumour in the throat);
- *Galashundika* (swelling of the uvula);
- *Putimamsa* (decayed flesh);
- *Alaji* (inflammation of the eyes, at the edge of the eye in particular);
- *Galaganda* (swelling of the neck, thyroid gland in particular);
- *Gandamala* (inflammation of the glands of the neck);
- *Upajihvika* (an abscess observed in epiglottis region)

Symptoms of injury to Mamsavaha Srotas

तत्र विद्धस्य श्वयथुर्मांसशोषः सिराग्रन्थयो मरणं च॥
सु.शा. - 9/12

- *Svayathu* (swelling)[108];
- *Mamsashosha* (dryness or atrophy of muscles)[109];

- *Siragranthi* (nodular swelling in blood vessels, particularly in veins)[110];
- *Marana* (death)

Muscular tissue

About 40% of the body is consisting of skeletal muscle and another 10% comprises smooth and cardiac muscle. Main functions of skeletal muscles are voluntary; and smooth muscles are of involuntary action and cardiac muscles are having special function that is rhythmicity and pumping action of the heart.

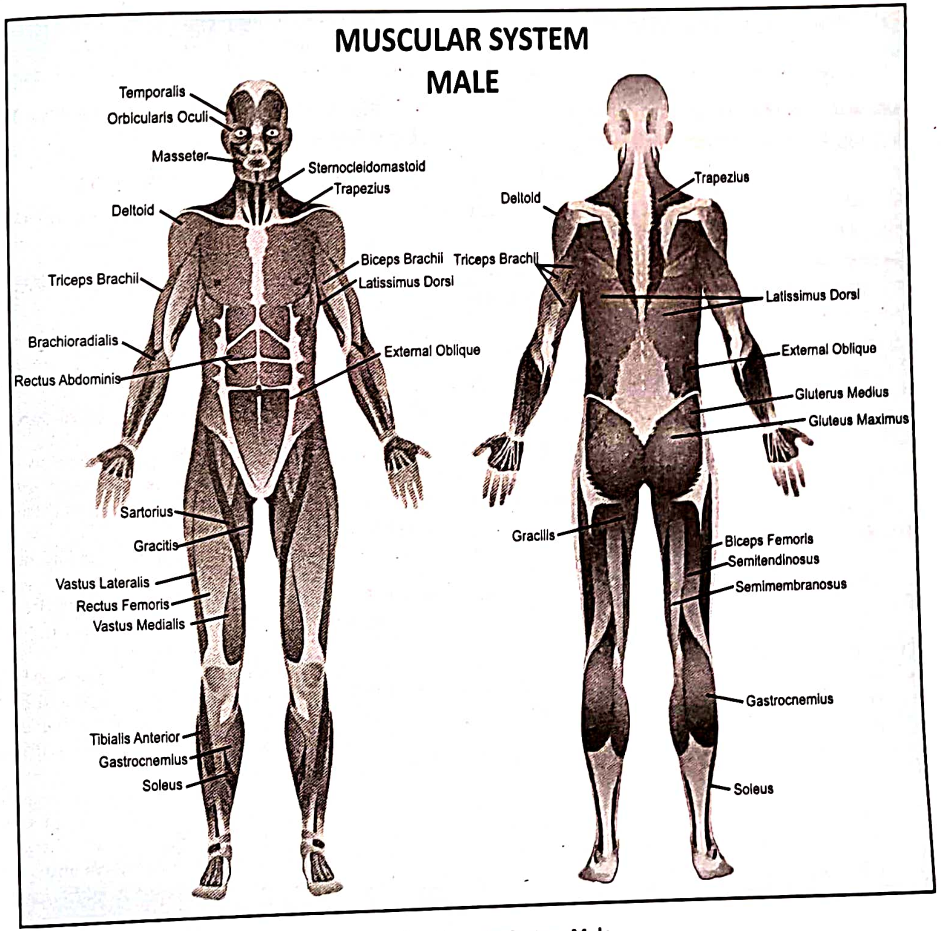
MUSCULAR SYSTEM
MALE
Temporalis
Orbicularis Oculi
Masseter
Sternocleidomastoid
Trapezius
Deltoid
Triceps Brachii
Biceps Brachii
Latissimus Dorsi
Brachioradialis
External Oblique
Rectus Abdominis
Sartorius
Gracilis
Vastus Lateralis
Rectus Femoris
Vastus Medialis
Tibialis Anterior
Gastrocnemius
Soleus
Deltoid
Triceps Brachii
Trapezius
Latissimus Dorsi
External Oblique
Gluteus Medius
Gluteus Maximus
Gracilis
Biceps Femoris
Semitendinosus
Semimembranosus
Gastrocnemius
Soleus

Fig 12.11: Muscular System Male

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[107] Also refer the context of Mamsa Vriddhi and Kshaya Lakshana mentioned in the present textbook

[108] Ganglion can be one of the examples for the swelling. It is a tense and cystic swelling containing gelatinous material in it. This mostly originates from the capsule of the joint or a tendon sheath. It may be due to a leakage in the capsule or the tendon sheath following trauma and subsequent encapsulation with fibrous tissue or it may be due to mucoid degeneration of the fibrous sheath.

[109] In case of fracture of femur, the person will have decreased mobility, the person will have reduced atrophy of the muscle of the lower limbs. Atrophy of the muscles can also be seen in case of brachial plexus injury too. This can be checked by measuring the lower limb with the help of measuring tape.

[110] This can be attributable to the aortic aneurysms or varicose veins.

Medovaha Srotas

Medovaha Srotomula

मेदोवह स्रोतसां वृक्कौ मूलं वपावहनं च॥ च.वि. -5/8

मेदोवहे द्वे, तयोर्मूलं कटी वृक्कौ च॥ सु.शा. - 9/12

As per *Caraka*, the sites of origin of *Medovaha Srotas* are *Vrikkau* (kidneys) and *Vapavahana* (omentum). As per *Sushruta*, *Medovaha Srotas* are two in number and their sites of origin are *Kati* (waist) and *Vrikkau* (kidneys).

Causes of affliction of Medovaha Srotas

अव्यायामाद्दिवास्वप्नान्मेद्यानां चातिभक्षणात्।
मेदोवाहीनि दुष्यन्ति वारुण्याश्चातिसेवनात्॥16॥

Ca.Vi. – 5/16

- ⇨ *Avyayama* (inadequate or negligible amount of exercise)[111];
- ⇨ *Divasvapna* (sleeping in day time) – sleeping in day time leads to the increase of *Snigdha Guna* in the body.
- ⇨ *Ati Medya Bhakshana* (excess consumption[112] of food substances which increase *Medas* in the body);
- ⇨ *Atisevana* of *Varuni* (excess consumption of intoxicating substances[113] like *Varuni*)

Symptoms of affliction of Medovaha Srotas

मेदःसंश्रयास्तु प्रचक्ष्महे।
निन्दितानि प्रमेहाणां पूर्वरूपाणि यानि च॥ च.सू. - 28/15

- ⇨ *Atisthoulya*[114] (obesity);
- ⇨ *Prameha Purvarupa* (premonitory symptoms suggesting *Prameha*)[115]

Symptoms of injury to Medovaha Srotas

तत्र विद्धस्य स्वेदागमनं स्निग्धाङ्गता तालुशोषः स्थूल शोफता पिपासा च॥

सु.शा. - 9/12

- ⇨ *Svedagamana* (excessive sweating);
- ⇨ *Snigdhangata* (unctuous body parts);
- ⇨ *Talushosha* (dryness of palate)[116];
- ⇨ *Sthulashophata* (swelling of whole body or major body parts);
- ⇨ *Pipasa* (thirst)[117]

Adipose tissue

Large quantities of fat[118] are stored in two major tissues of the body, the adipose tissue and liver. The adipose tissue is usually called fat deposits or simply tissue fat[119]. The major function of adipose tissue is storage of triglycerides that are needed to provide energy elsewhere in the body. Another major function of adipose tissue is to provide heat insulation for the body.

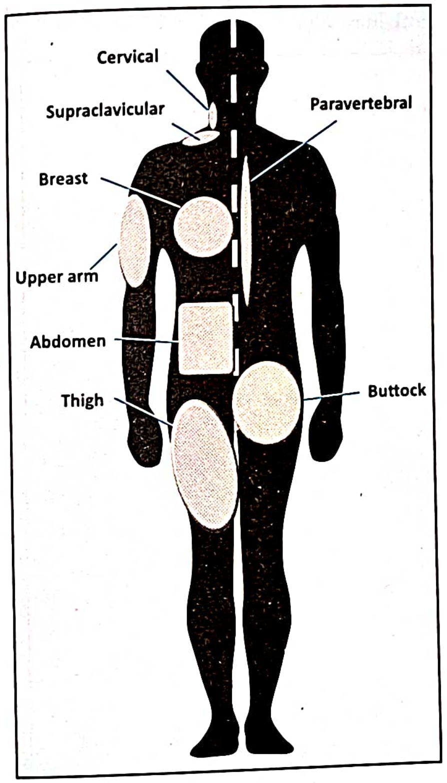

Fig 12.12: Adipose Tissue

Adipose tissue comprises adipocytes. Adipocytes or fat cells are modified fibroblasts that store almost pure triglycerides[120] in quantities as great as 80 to 95% of the entire cell volume. Triglycerides are usually liquid in form generally.

Insulin plays a major role in the fat[121] metabolism in the body by inhibiting the action of hormone sensitive lipase present in the adipocytes and promoting the uptake of glucose by the cell membrane of adipocyte. Thus, presence of insulin[122] inhibits the metabolism of fat in the body.

Asthivaha Srotas

Asthivaha Srotomula:

अस्थिवहानां स्रोतसां मेदो मूलं जघनं च। च.वि. -5/8

The description of *Asthivaha Srotas* is explained by *Caraka*, not by *Sushruta*. The sites of origin of *Asthivaha Srotas* are *Medas* (adipose tissue) and *Jaghana* (buttocks).

Causes of affliction of Asthivaha Srotas:

व्यायामादतिसंक्षोभादस्थ्नामतिविघट्टनात्।
अस्थिवाहीनि दुष्यन्ति वातलानां च सेवनात्॥17॥

Ca.Vi. – 5/17

- ⇨ ***Vyayama* (excess exercise)** – refer the context of Vyayama in the *Vata Prakopaka Karana* to understand this concept.
- ⇨ ***Atisamkshobha*** (measures which are responsible for irritation in the body such as lifting heavy weights) – this manoeuvre is leading to the increase of the *Vata Dosha* and more stress on *Asthi*, thereby there is a

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G K

111 Any condition which leads to continuous imbalance between food intake and energy expenditure will lead to obesity. In this case, if the person is having sedentary life style this will cause increased energy input and decreased energy output thus increased adipose tissue formation in different parts of the body such as subcutaneous tissues, breasts, abdomen, thighs and buttocks.

112 Excess or overnourishment is responsible for the shift of nutrients into adipose tissues in subcutaneous tissues, breasts, abdomen, thighs and buttocks.

113 Due to excess consumption of alcoholic beverages, there will be shift of metabolism from carbohydrate to fat, leading to fatty liver change and the person will become lean due to decrease in the adipose tissue in the body.

114 This is attributable to the clinical condition called obesity where there will be presence of excess of fat in the body. In clinical terms, body mass index (BMI) between 25 to 30 is termed as overweight and body mass index more than 30 is termed as obesity. This usually results due to greater energy intake than energy expenditure. The fat is stored mainly in adipocytes in subcutaneous tissues and in the intraperitoneal cavity and liver, significant amount of fats are stored.

115 When the person is diagnosed to be suffering from diabetes mellitus, metabolism of the body becomes disarray. Carbohydrate metabolism will be shifted to commencement of fat metabolism and in the absence of fat metabolism, protein metabolism will be initiated. During the utilisation of fat, fat will be mobilised to blood circulation and to the liver. Thus, the individual suffering from diabetes mellitus, may suffer from atherosclerosis and fatty liver changes. Thus, we can say the person suffering from *Majjavaha Srotodushti*, dysmetabolism of fat will be observed.

116 This is attributable to the mechanism of thirst.

117 This is attributable to the excess fluid loss which occurs as a sequel to hypovolemia which is the outcome of polyuria of diabetes mellitus.

118 Oestrogen is known to increase the deposition of fat in the female, especially in breasts, hips and subcutaneous tissues.

119 The average non athletic female has about 27% of the fat accumulation in the body and average non athletic male has the fat accumulation of about 15%.

120 Triglycerides in the fat cells are renewed once in every 2 to 3 weeks, which means that the fat stored in the tissues today is not the same fat that was stored in the last month, thus emphasising the dynamic state of storage fat.

121 The chemical structure of steroid hormone is similar to cholesterol and in most instances, they are synthesised from cholesterol itself.

122 Insulin deficiency causes
1. lipolysis of fat and release of free fatty acids from adipocytes
2. increases plasma cholesterol and phospholipid concentration in the body
3. Causes ketosis and acidosis in the body due to the increase of acetoacetic acid.

possibility of decrease of *Asthi* in the body.

- ⇨ ***Asthi Ativighattana*** (excess friction between bones) – this is occurring due to the friction between bones having degenerative changes in the joint surfaces which further worsens the inflammatory changes in the joint surfaces.
- ⇨ ***Vatala Sevana*** (exposure to diet and regimen which increase *Vata* in the body such as consumption of bitter, pungent substances etc) – this is having the inverse relation with *Asthi* and *Vata*. That means there will be vitiation of *Vata Dosha* and decrease of *Asthi* in the body.

Symptoms of affliction of Asthivaha Srotas

अध्यस्थिदन्तौ दन्तास्थिभेदशूलं विवर्णता।
केशलोमनखश्मश्रुदोषाश्चास्थिप्रदोषजाः॥ च.सू. - 28/16

- ⇨ *Adhyasthi* (excess growth of bones)[123];
- ⇨ *Adhidanta* (excess growth of teeth)[124];
- ⇨ *Dantasula* (toothache)[125];
- ⇨ *Asthishula* (pain in bones);
- ⇨ *Dantabheda* (tearing type of pain in teeth);
- ⇨ *Asthibheda* (tearing type of pain in bones);
- ⇨ *Vivarnata* (discolouration);
- ⇨ *Kesha, Loma, Nakha, Smashru Dosha* (defects of scalp hair, body hair, nails and beard)

Bone

Bone is composed of a tough organic matrix as well as deposits of calcium salts. Average compact bone is composed of 30% matrix and 70% salts. Newly formed bone may have considerably higher percentage of matrix in relation to salts.

- ⇨ **Organic matrix:** The organic matrix of bone is 90 to 95% of collagen fibres and the remainder is homogenous gelatinous medium called ground substance. The collagen fibres provide bone a powerful tensile strength. The ground substance is composed of extra cellular fluid as well as proteoglycans, especially chondroitin sulphate and hyaluronic acid. These may help in the control and deposition of calcium salts.

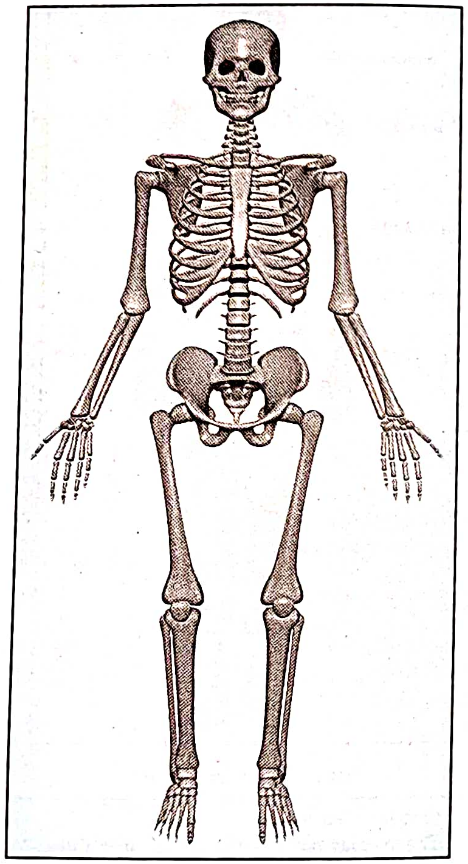

Fig 12.13: Skeletal System

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[123] This is seen in especially in degenerative joint diseases where in deformity of the bones is present. For example, in case of genu valgum deformity etc.

[124] For example, when the molar of the mandible is removed, excess growth of the molar from the maxilla occurs

[125] Any kind of pain ranging from tooth ache or pain in bones etc involvement of *Vata Dosha* is inferred. It is said in *Ayurveda* that *Vata* and *Asthi* are having relation, whenever pain is there, involvement of *Vata Dosha* is a must.

- ⇨ **Bone salts:** The crystalline salts deposited in the organic matrix of bone are composed principally of calcium and phosphate. Other components of bone salts are magnesium, sodium, potassium and carbonate ions.
- ⇨ **Cell types:**
  - ❑ **Osteoblasts** – concerned with bone formation
  - ❑ **Osteocytes** – concerned with maintenance of bone
  - ❑ **Osteoclasts** – concerned with bone resorption

Majjavaha Srotas

Majjavaha Srotomula

मज्जावह स्रोतसामस्थीनि मूलं सन्धयश्च।
च.वि. -5/8

The description of sites of origin of *Majjavaha Srotas* is mentioned by *Caraka* and we cannot get the description of *Majjavaha Srotas* in *Sushruta Samhita*. The sites of origin of *Majjavaha Srotas* are *Asthi* (bones) and *Sandhi* (joints).

Causes of affliction of Majjavaha Srotas

उत्पेषादत्यभिष्यन्दादभिघातात् प्रपीडनात्।
मज्जवाहीनि दुष्यन्ति विरुद्धानां च सेवनात्॥18॥
Ca.Vi. – 5/18

- ⇨ *Utpesha* (crushing type of injury)[126];
- ⇨ *Atyabhishyanda* (excess consumption of substances which increase *Kledatva* in the body such as curds, fish etc);
- ⇨ *Abhighata* (injury)[127];
- ⇨ *Prapidana* (squeezing);
- ⇨ *Viruddha Sevana* (excess consumption of *Viruddha* substances like fish and milk at a time or consumption of ghee and honey at a time)

Symptoms of affliction of Majjavaha Srotas

रुक् पर्वणां भ्रमो मूर्च्छा दर्शनं तमसस्तथा।
अरुषां स्थूलमूलानां पर्वजानां च दर्शनम्॥
मज्जाप्रदोषात् ......।
च.सू. - 28/17-18

- ⇨ *Parvanam Ruk* (pain in joints)[128];
- ⇨ *Bhrama* (giddiness)[129];
- ⇨ *Murccha* (altered state of consciousness)[130];
- ⇨ *Tamo Darshana* (appearance of darkness in front of eyes)[131];
- ⇨ *Arunshi* in *Parva* which are having *Sthulamula* (deep seated ulcers[132] in joints)

Bone marrow

Bone marrow measures about 4,000 ml in adults in adults, 50% of this is red bone marrow and rest of the bone marrow is yellow bone marrow. Red bone marrow is present in epiphysis of femur, humerus and spongy bones of skull and vertebrae. Yellow bone marrow is present in all other parts of long bones.

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[126] Crushing type of injury is responsible for the multiple small fractures of the bone.

[127] Trauma to any bone of the body will be responsible multiple small fractures of the bone.

[128] Articular involvement (joint surface) in the manifestation of the disease can be considered in case of involvement of *Majja* abnormality. It is mentioned in the classics that *Sandhi* is considered to be *Mula* of *Majjavaha Srotas*.

[129] *Bhrama, Murcha* and *Tamas Darshana* are attributable to the involvement of brain tissue, as it is being stated in *Ayurveda, Majja Dhatu* is situated inside the *Asthi*. Thus, we can say that there is an indirect inference of affliction of *Dhatu* in the body.

[130] As per literatures of *Ayurveda*, brain is considered as part of *Majja Dhatu*, as brain is situated in the bony covering called skull (part of *Asthi*). That is why any altered activitiy in relation to functions of the brain is considered as *Srotodushti Lakshana* of *Majjavaha Srotas*.

[131] Refer the description in Majja Kshaya context for better understanding.

[132] These types of ulcers are usually observed in the lower limbs either unilateral or bilateral. As per fundamentals of *Ayurveda, Asthi* and *Sandhi* are the *Srotomula* of *Majjavaha Srotas*.

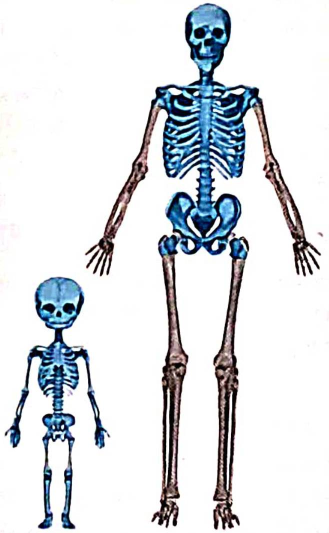

Fig 12.14: Bone Marrow

Functions of bone marrow

- ⇨ **Destruction of old RBCs:** The senescent RBCs are destroyed by the macrophages of red bone marrow and the iron content of haemoglobin of destroyed RBCs is split into two components haemosiderin and ferritin. These components are stored in liver, spleen and bone marrow for the resynthesis of RBCs.
- ⇨ **Formation of blood cells:** All three types of blood cells – erythrocytes, leucocytes and platelets are formed by red bone marrow[133].
- ⇨ **Storage of iron:** Iron is stored in the form of haemosiderin in red bone marrow.
- ⇨ **Macrophages** destroy the toxins circulating in the blood.
- ⇨ **Nourishment** to the bones: All three types of cells of bone – osteoblasts, osteocytes and osteoclasts are produced from bone marrow itself.

Sukravaha Srotas

Shukravaha Srotomula

शुक्रवह स्रोतसां वृषणौ मूलं शेफश्च। च.वि. 5/8
शुक्रवहे द्वे, तयोर्मूलं स्तनौ वृषणौ च। सु.शा. - 9/12

As per *Caraka*, the sites of origin of *Shukravaha Srotas* are *Vrishana* (testicles) and *Shepha* (penis). As per *Sushruta*, the *Shukravaha Srotas* are two in number and their sites of origin are *Stana* (breasts) and *Vrishana* (testicles).

Causes of affliction of Shukravaha Srotas

अकालयोनिगमनान्निग्रहादतिमैथुनात्।
शुक्रवाहीनि दुष्यन्ति शस्त्रक्षाराग्निभिस्तथा॥1 9॥
Ca.Vi. – 5/19

- ⇨ *Akalayonigamana* (performing sexual activity without proper foreplay)[134];
- ⇨ *Nigraha* (suppression of *Sukravega* or sexual urge)[135];
- ⇨ *Atimaithuna* (excess sexual activity)[136];
- ⇨ *Sastra Kshara* and *Agni* (applying surgical instruments, *Kshara* and *Agni* to the genital organs)

Symptoms of affliction of Shukravaha Srotas

शुक्रस्य दोषात् क्लैब्यमहर्षणम्।
रोगी वा क्लीबमल्पायुर्विरूपं वा प्रजायते॥
न चास्य जायते गर्भः पतति प्रस्रवत्यपि।
शुक्रं हि दुष्टं सापत्यं सदारं बाधते नरम्॥
च.सू. - 28/18-19

- ⇨ *Klaibya* (inability to perform sexual activity or erectile dysfunction or impotence)[137];
- ⇨ *Aharshana* (dysfunction[138] related to sexual gratification or orgasmic dysfunction);
- ⇨ *Kliba, Alpayu* and *Virupa* (the person will be impotent, short life span and disfiguration);
- ⇨ his spouse will be having frequent abortion[139];
- ⇨ His spouse and children will be suffering from illness[140]

Symptoms of injury to Shukravaha Srotas

- ⇨ *Klibata* (impotence)[141];
- ⇨ *Chirat Praseka* (delayed ejaculation);
- ⇨ *Raktasukrata* (presence of blood in semen)

Male reproductive system

Functional anatomy of male reproductive system: consists of testis[142], epididymis, vas deferens, prostate, seminal vesicles, ejaculatory duct, male urethra, penis and bulbo urethral glands.

- ⇨ **Testis** is composed of upto 900 coiled seminiferous tubules, each averaging more than half meter long where sperms are formed.
- ⇨ **Epididymis:** another coiled tube about 6 meters long, where sperms are emptied from seminiferous tubules.
- ⇨ **Vas deferens:** the channel which transports the sperms from epididymis to the ampulla of vas deferens from there to the body of the prostate.
- ⇨ **Seminal vesicles:** two in number, they will empty their secretions into ampulla of vas deferens and the contents of seminal vesicles and prostate will be emptied into ejaculatory duct and thence to prostatic urethra.
- ⇨ **Urethra:** The last connecting link from testis to the exterior.
- ⇨ **Cowper's (bulbo urethral) glands:** secrete mucus into the semen[143].

1. Spermatogenesis – formation of sperm[144]

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[133] Lack of functioning of red bone marrow leads to the condition of aplastic anaemia. Probable causes of aplastic anaemia include excessive x-ray treatment, exposure to certain industrial chemicals and exposure to certain therapeutic drugs.

[134] In case of male, normally there will be parasympathetic stimulation occurs erection and secretion of mucus by urethral and bulbourethral glands. This mucus facilitates the movement during the coitus due to proper lubrication.
In case of females, normally there will be parasympathetic stimulation which leads to the excess secretion of mucus by Bartholin glands which helps in the lubrication which facilitates coitus.
Without proper foreplay, there will be lack of stimulation of these glands which leads to the reduced secretion of mucus thus the couple indulged in sexual intercourse may not go into a state of orgasm.

[135] Suppression of sexual urge is said to be responsible for
1. Decreased testosterone secretion
2. Decreased sexual desire or libido

[136] Hypersexual activity is considered to be responsible for several sexually transmitted diseases or disorder related to either male or female reproductive system.

[137] This is seen in the patients who are not indulging in sexual activity without adequate foreplay. This can also be seen in patients who are having reduced libido.

[138] In this situation, the couple are capable of performing sexual intercourse, but the couple cannot attain the stage of orgasm.

[139] This type of situation arises when the couple are having Rh incompatibility, husband with Rh +ve blood group and wife with Rh -ve blood group. Habitual abortions occur due to the improper management during first child birth.

[140] The person will be suffering from sexually transmitted infection. Even the spouse and children may suffer from the disease.

[141] The term impotence is replaced by erectile dysfunction. Refer the term in description of erectile dysfunction.

[142] Two testes will produce 120 million sperms each day.

[143] Semen is the ejaculated fluid during male sexual act is composed of the and sperm from vas deferens (10%), fluid from seminal vesicles (60%), fluid from prostate gland (30%) and small amount of mucus from bulbo urethral glands.

[144] Sperm can live for many weeks in male genital ducts, but once ejaculated, their maximum life span is only 24 to 48 hours at body temperature.
At lowered temperatures semen can be stored for several weeks, where as sperm stored frozen at - 100° C, sperms can be preserved for several years.

The functions of male reproductive system can be divided into three major sub divisions.

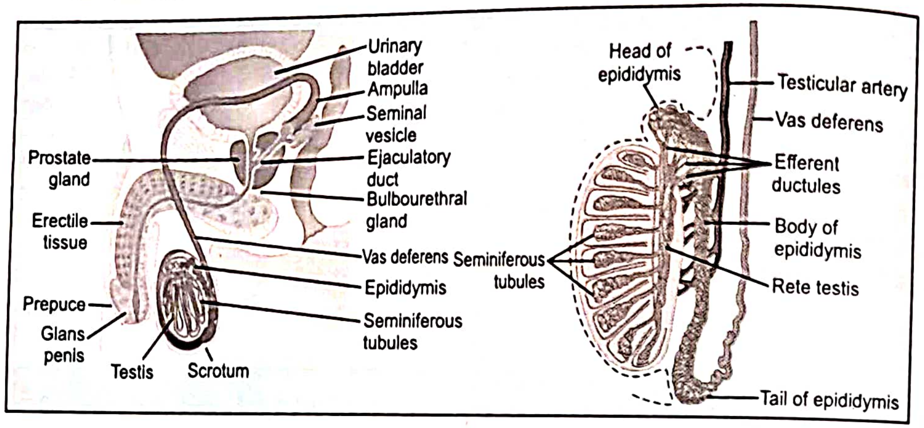

Fig 12.15 :Male Reproductive System

2. Performance of male sexual act
3. Regulation of male reproductive functions by various hormones.

⇨ Spermatogenesis[145] occurs in seminiferous tubules during active sexual life as a result of stimulation of anterior pituitary gonadotropic hormones, beginning at the average age of 13 years, and continuing throughout the most remainder of life, but decreasing markedly in old age.

Spermatogonia (44 + XY)

Primary spermatocytes (44 + XY)

Secondary spermatocytes (22 + X) and (22 + Y)

Spermatids (22 + X) (22 + X) (22 + Y) (22 + Y)

Spermatozoa or sperms[146] (after maturation)

(22 + X) (22 + X) (22 + Y) (22 + Y)

Few clinical conditions afflicting male reproductive system

⇨ **Orchitis** – is infection of testis. Symptoms include testicular pain and swelling. Diagnosis is clinical.

⇨ **Erectile dysfunction** – is the inability to attain or sustain an erection satisfactory for sexual intercourse. Most erectile dysfunction is related to vascular, neurologic, psychologic and hormonal dysfunction. Evaluation is screening for underlying disorders and measuring testosterone levels in the body.

⇨ **Benign prostatic hyperplasia** – is a non malignant adenomatous overgrowth of prostate gland. This is characterised by weak stream, hesitancy, intermittency, urgency, nocturia, incomplete emptying of urinary bladder, terminal dribbling and urge incontinence and sometimes complete urinary retention. Diagnosis is done by symptoms, digital rectal examination, cystoscopy, ultrasonography or other abdominal imaging.

Mutravaha Srotas

Mutravaha Srotomula:

मूत्रवह स्रोतसां बस्तिर्मूलं वंक्षणौ च। च.वि. - 5/8

मूत्रवहे द्वे, तयोर्मूलं बस्तिर्मेढ्रं च।। सु.शा. - 9/12

As per *Caraka*, the sites of origin of *Mutravaha Srotas* are *Basti* (urinary bladder) and *Vamkshana* (groin; pubic or iliac region). Whereas as per *Sushruta*, the number of *Mutravaha Srotas* are two in number and their sites of origin are *Basti* (urinary bladder) and Medhra (penis).

Causes of affliction of Mutravaha Srotas:

मूत्रितोदकभक्ष्यस्त्रीसेवनान्मूत्रनिग्रहात्।
मूत्रवाहीनि दुष्यन्ति क्षीणस्याभिक्षतस्य च।।20।।
Ca.Vi. – 5/20

⇨ *Mutritodaka bhakshya* and *Stri Sevana* (consumption of food and drinks when one is having urge for micturition, performing sexual activity when one has urge for micturition)[147];

⇨ *Mutra Nigraha* (suppression of urge of micturition)[148];

⇨ *Kshinasya* (when the person is having *Kshina Dhatu*)[149];

⇨ *Abhikshatasya* (when the person is having injury or trauma to any part of the body)[150]

Symptoms of affliction of Mutravaha Srotas

प्रदुष्टानां तु खल्वेषामिदं विशेषविज्ञानं भवति तद्यथा अतिसृष्टमतिबद्धं प्रकुपितमल्पाल्पमभीक्ष्णं वा बहलं सशूलं मूत्रयन्तं दृष्ट्वा मूत्रवहान्यस्य स्रोतांसि प्रदुष्टानीति विद्यात्। च.वि. - 5/8

⇨ ***Atisrishta Mutra*** (frequent passage of urine)[151];

⇨ ***Atibaddha Mutra*** (reduced quantity of passage of urine)[152];

⇨ ***Prakupita Mutra*** (abnormal urine such as yellowish or reddish or whitish urine)[153] which may suggest *Dosha Prakopa* in the body;

⇨ ***Alpalpa Mutra*** (frequent passage of small

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145 The entire period of spermatogenesis from spermatogonia to spermatozoa takes about 74 days.

146 Normal sperm can move in a fluid medium at a speed of 1 to 4 mm/ minute.

147 Micturition reflex is a single complete cycle of 1. Progressive and rapid increase of pressure, 2. A period of sustained pressure and 3. Return of the pressure to the basal tone of urinary bladder. Once a micturition reflex has occurred but could not be materialised, then nervous elements of this reflex remain inhibited for a few minutes to 1 hour or more before another micturition reflex occurs. As the bladder filled more and more filled, the micturition reflexes occur more and more often and more and more powerfully. Thus, when a person neglects the nature's call of micturition, during the consumption of water, food or sexual intercourse, then micturition reflex will be inhibited for a few minutes to 1 hour or more leading to the clinical presentation of frequent lower abdominal pain.

148 Normally urinary bladder will get stimulated when the amount of urine is around 200 – 250 ml in urinary bladder. If the volume of urine goes beyond 300 – 400 ml, the person is presented with frequent onset of pain in the suprapubic region due to the frequent contraction of muscles of urinary bladder. This pain may last for few seconds to more than a minute.
The pathological changes can happen during suppression of urine are enlargement of lower abdomen, hydroureter (ureter filled with urine due to backflow of urine from bladder) and hydronephrosis (back-flow of urine into the kidneys).

149 Loss of fluid from all compartments of the body i.e. gastrointestinal lumen, intravascular compartment, interstitial compartment and intracellular compartment is termed as dehydration. This will lead to hypovolemia.
The conditions which lead to this clinical manifestation are
1. Condition of excessive sweating
2. Excess fluid loss in vomiting and diarrhoea
3. Excess loss of fluid by nephrotic kidneys
4. Inadequate intake of fluid and electrolytes
5. Destruction of adrenal cortex with lack of secretion of aldosterone

150 Injury to any part of the body leads to the circulatory impairment. Sometimes, even contusion of the body can damage the capillaries leading to the excess movement of plasma into the tissues. This condition is leading to hypovolemia. This is responsible for hypoperfusion of renal arteries leading to the condition called pre renal azotemia.

151 Any condition leading to the irritation of bladder by infection, stone, tumor or blood; any condition leading to the irritation of the bladder by compression from surrounding structures etc

152 Any condition leading to retention of urine such as obstructive lesion of urethra such as stricture or benign prostatic hyperplasia

153 Different clinical conditions will lead to the discolouration of urine. For example, greenish or yellowish

amount of urine)[154];

- ⇨ ***Bahala Mutra*** (excess passage of urine at a particular time)[155]
- ⇨ ***Sashula Mutra*** (painful micturition)[156]

Symptoms of injury to Mutravaha Srotas

तत्र विद्धस्यानद्धबस्तिता मूत्रनिरोधः स्तब्धमेढ्रता।।

सु.शा. - 9/12

- ⇨ ***Anaddha Bastita*** (swelling of lower abdomen due to retention of urine)[157];
- ⇨ ***Mutranirodha*** (retention of urine)[158];
- ⇨ ***Stabdhamedhrata*** (reduced movement of penis)[159]

Urinary system:

- ⇨ Urinary system is composed of two kidneys, two ureters, one urinary bladder and one urethra.
- ⇨ Kidneys are reddish, bean shaped organs located just above the waist between peritoneum and posterior wall of the abdomen, and it is a retroperitoneal organ. The structural and functional unit of kidney is nephron. Each kidney is composed of 1 million[160] nephrons.
- ⇨ The following are the functions of kidneys which help in maintaining the homeostasis of the body
  - ☐ Excretion of metabolic end products and foreign chemicals
  - ☐ Regulation of water and electrolyte balance
  - ☐ Regulation of body fluid and electrolyte concentration
  - ☐ Regulation of arterial pressure
  - ☐ Regulation of acid base balance
  - ☐ Secretion, metabolism and excretion of hormones
  - ☐ Gluconeogenesis
- ⇨ **Ureters**[161]: are the two tubular structures that connect the renal pelvis of each kidney to the urinary bladder. Its wall is made up of smooth muscles and innervated by sympathetic and parasympathetic nervous system and by intramural plexus of neurons and nerve fibres that extend along the entire length of ureter.
- ⇨ **Urinary bladder**[162]: ureters enter the urinary bladder through detrusor muscle in the trigone region of bladder. The smooth muscle of urinary bladder is called detrusor muscle. Its muscle fibres extend in all directions of bladder, when contracted, it can produce a pressure of 40 to 60 mmHg in the bladder, thereby initiating the act of micturition[163].
- ⇨ **Urethra** is the tubular structure which x carries the urine[164] from the urinary bladder to the exterior. At the junction of urinary bladder and urethra where urethra passes through urogenital diaphragm, there is a layer of muscle, termed as external sphincter of the bladder. This sphincter is a voluntary skeletal muscle.

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discolouration is seen in hepatobiliary dysfunction; reddish colour is seen in conditions of haematuria; black coloured urine in alkaptonuria; pink coloured urine in the persons who have consumed beetroot.

[154] This can occur when the person is under severe stress.

[155] When the person is presented with the complaint of polyuria (urine volume > 3,000 ml in 24 hours) this type of presenting complaint is observed such as diabetes mellitus or diabetes incipidus.

[156] When the person is suffering from inflammatory and infective conditions of urinary tract, presence of renal calculus in ureter. The person may have pain in the renal angle; radiating pain from loin to groin or pain in supra pubic region. These complaints are associated with micturition.

[157] This presenting complaint is secondary to acute retention of urine.

[158] Retention of urine refers to incomplete emptying of urinary bladder or cessation of urination. The causes include impaired bladder contractility, bladder outlet obstruction, detrusor sphincter dyssynergia.

[159] The term priapism refers to painful, persistent, abnormal erection unaccompanied by sexual desire or excitation. This is attributable to priapism due to unregulated arterial inflow usually as a result of formation of arterial fistula secondary to trauma. This is non painful when compared to ischemic priapism.

[160] After the age of 40 years, there will be 10% decrease in functioning nephrons for every 10 years. This loss is not life threatening as other functioning nephrons take over the function of non-performing nephrons.

[161] The length of ureter may vary from 25 – 30 cms.

[162] When the urine is filled in urinary bladder about 200 – 250 ml, then the person gets the urge of micturition.

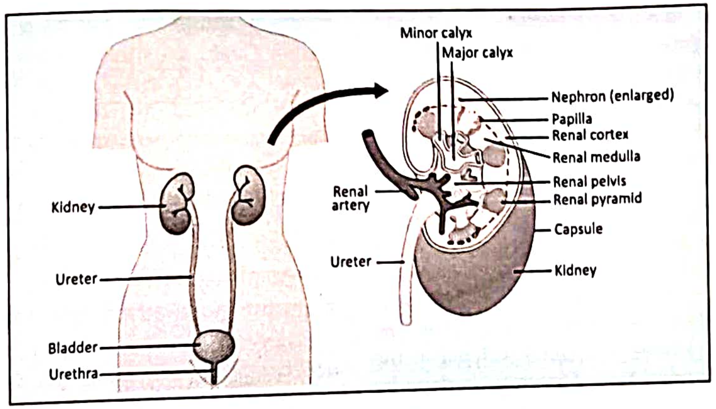

Fig 12.16: Urinary System

Few clinical conditions afflicting excretory system

- ⇨ **Urinary tract infection:** Urinary tract infections can be categorised into two types upper tract infections and lower tract infections. Upper tract infections are usually associated with increased frequency of micturition and lower tract infections are usually associated with burning micturition. Clinical features may also include pain in the lower abdomen, dysuria, increased frequency and urgency and flank pain. Diagnosis is done by urinalysis and culture of urine.
- ⇨ **Urinary calculi** – these are solid particles in the urinary system. They may cause pain, nausea, vomiting, haematuria, chills and fever. The pain may be colicky type of pain and radiates from loin to groin. Diagnosis is by urinalysis and radiologic imaging.
- ⇨ **Acute renal failure:** Acute renal failure (ARF) is a rapid decrease in renal function over days to weeks, causing accumulation of nitrogenous products in the blood. This condition is called as azotemia. It results from severe trauma, illness or surgery, but sometimes caused by rapidly progressive, intrinsic renal disease. Symptoms include anorexia, nausea and vomiting. If untreated, the person may present with seizures and coma. Diagnosis is by laboratory assessment of renal function, including serum electrolytes and serum creatinine.
- ⇨ **Chronic kidney disease** – is a long standing, progressive deterioration of renal function. The clinical features presented by the suffering individual are usually slow to develop. These are anorexia,

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[163] When the person is completed the act of micturition, ordinarily, 5 to 10 ml of urine may be left in the urinary bladder.

[164] Urine formation involves three steps.
1. Glomerular filtration
2. Selective reabsorption
3. Selective secretion

nausea, vomiting, nocturia, lassitude, fatigue, pruritus, decreased mental acuity, muscle twitches, cramps, water retention, gastrointestinal bleeding. He may be suffering from peripheral neuropathy and seizures. Diagnosis is done by renal function test and renal biopsy.

⇨ **Nephrotic syndrome** – is a syndrome associated with urinary excretion of > 3gm of protein/ day due to glomerular disorder. Clinical features include anorexia, malaise, fluid retention. The person may be presented with periorbital oedema in the early morning time. Diagnosis is done by determination of proteinuria.

Purishavaha Srotas

Purishavaha Srotomula:

पुरीषवहानां स्रोतसां पक्वाशयो मूलं स्थूलगुदं च।

च.वि. -5/8

पुरीषवहे द्वे, तयोर्मूलं पक्वाशयो गुदं च। सु.शा. - 9/12

As per *Caraka*, the sites of origin of *Purishavaha Srotas* are *Pakvashaya* (large intestine) and *Sthulaguda* (rectum). As per *Sushruta*, the *Purishavaha Srotas* are two in number and their sites of origin are *Pakvashaya* (large intestine) and *Guda* (anus).

Causes of affliction of Purishavaha Srotas:

संधारणादत्यशनादजीर्णाध्यशनात्तथा।
वर्चोवाहीनि दुष्यन्ति दुर्बलाग्नेः कृशस्य च॥21॥

Ca.Vi. – 5/21

⇨ *Sandharana* (suppression of urge of defecation)[165][166];

⇨ *Atyashana* (consumption of excess quantity of food)[167];

⇨ *Ajirna Adhyashana* (consumption of food prior to the digestion of food consumed)[168];

⇨ *Durbalagni* (when the person has poor digestive fire)[169];

⇨ *Krisha* (emaciated condition)[170]

G K

165 We know that normally faecal matter consists of 3/4th of water portion and 1/4th of solid matter. When the person neglects the nature's call of defaecation, then water portion of the faecal matter will be reabsorbed from the rectum, thereby the person will be presented with constipation frequently. The person gets the urge of defaecation, only when another portion of faecal matter arrives to the rectum which causes stretching of the rectum.

166 Suppressing the urge of defaecation is responsible for the absorption of 3/4th of water portion of faecal matter in sigmoid colon and thus solidifying the stool mass. The person will pass very hard faecal matter. Along with this, there will be absorption of methane, hydrogen, ammonia from the large intestine which will be eliminated via lungs.

167 Consumption of excess quantity of food at a particular time is said to be responsible for the vitiation of Tridosha.
It is said that mass movement which is a specific movement seen in large intestine. Gastrocolic reflex and duodenocolic reflex are the two reflexes initiated when the stomach and duodenum are stretched and these reflexes generate mass movements which expel the faecal matter from anus.

168 Consumption of food in excess quantity may be responsible for
1. Hampered digestion of food in the stomach
2. Poor absorption from the large intestine
3. Increased amount of chyme to be entered into the caecum
4. Poor absorption in the large and intestine leading to passage of semisolid stools
5. Passage of semisolid to liquid stools frequently

169 Concept of digestion and absorption
– Total quantity of fluid absorbed from alimentary canal is equal to quantity of fluid ingested (1.5 liters) and various GI secretions (7 liters)
– If the person is having poor digestive function, macronutrients are not converted into micronutrients, entry of improperly digested materials into large intestine leading to improperly formed stools.

170 There is a relation between emaciated individual and reduced gut microbiome.
Action of bacteria of gut

Symptoms of affliction of Purishavaha Srotas

प्रदुष्टानां तु खल्वेषामिदं विशेषविज्ञानं भवति; तद्यथा कृच्छ्रेणाल्पाल्पं सशब्दशूलमतिद्रवमतिग्रथितमतिबहु चोपविशन्तं दृष्ट्वा पुरीषवहान्यस्य स्रोतांसि प्रदुष्टानीति विद्यात्।

च.वि. - 5/8

⇨ *Kricchrena Alpalpa Purisha Pravritti* (frequent passage of small amount of feces with difficulty)[171];

⇨ *Sasabda*[172] and *Sashula*[173] *Pravritti* (passage of fecal matter with pain or passage of fecal matter with flatus or both);

⇨ *Atidrava Pravritti* (frequent passage of semi solid or liquid stools)[174];

⇨ *Atigrathita Pravritti* (frequent passage of very hard stools)[175];

⇨ *Atibahu Pravritti* (frequent passage of large amount of stools)[176]

Symptoms of injury to Purishavaha Srotas

तत्र विद्धस्यानाहो दुर्गन्धता ग्रथितान्त्रता च।

सु.शा. - 9/12

⇨ *Anaha* (distension of the abdomen)[177];

⇨ *Durgandhata* (foul smell)[178];

⇨ *Grathitantrata* (small swellings in the intestines)[179]

G K

- Digestion of cellulose which provide nutrition to the body
- Production of vitamin K, vitamin B 12, thiamine, vitamin K from external sources is very rare.
- Production of gases carbon dioxide, methane, hydrogen
- Certain food substances such as beans, cabbage, onion, cauliflower, corn and vinegar leads to increased formation of gases.

171 This is attributable to the slower movement of large intestine. This phenomenon is observed in either tumours of largen intestine or intestinal adhesions.
We already know that 75% of the faecal matter is composed of water portion and remaining 25% contains solid roughage. When the slower movement is observed in the large intestine, this is responsible for the absorption of maximum portion of liquid portion leading to hard, dry faecal matter. Thus, the person will be frequently complaining the passage of small, dry and hard faecal matter.

172 When the person is consuming the substances such as beans, cabbage, onion, cauliflower, corn and vinegar, there will be increased formation of gases in the large intestine. These gases are produced due to the bacterial action in the large intestine. The gases produced in the large intestine are carbon dioxide, methane and hydrogen.
The person will pass the flatus with sound when there is excess production of methane and hydrogen.

173 The term Sashula Pravritti refers painful defaecation. This type of clinical presentation is specifically observed when the person is having either inflammatory condition of large intestine and in ano rectal diseases such as fissure in ano.

174 The term refers to passage of liquid to semiliquid stools. This results from rapid movement of faecal matter through the large intestine. The inflammatory condition of large intestine will be responsible for diarrhoea.

175 Refer the above description

176 This is attributable to rapid movement of the large intestine and hampered absorption of the colonic contents.

177 Rupture of the large intestine may be intraperitoneal or extraperitoneal. Rupture of ascending and descending colon may be intra or extraperitoneal, whereas rupture of transverse and sigmoid colon is often intraperitoneal. Intraperitoneal rupture will lead to severe peritonitis as contents of large intestine are highly infective. This condition may lead to paralytic ileus. This condition is usually associated with loss of peristalsis.

178 This is attributable to the gas gangrene developed due to injury to large intestine. This pathological mechanism usually develops after trauma. This is caused by clostridial soft tissue infection. Symptoms of gas gangrene may include oedema, pain, gas with crepitation, foul smelling exudates, intense colouration of the site and progression to shock and renal failure.

179 This can be attributable to the consequence of either surgical or traumatic injury. This could be due to

Defaecation

Large intestine:

Large intestine is one of the major organs of alimentary canal. It is also known as colon. The organ extends from ileo caecal valve to anus. It consists of

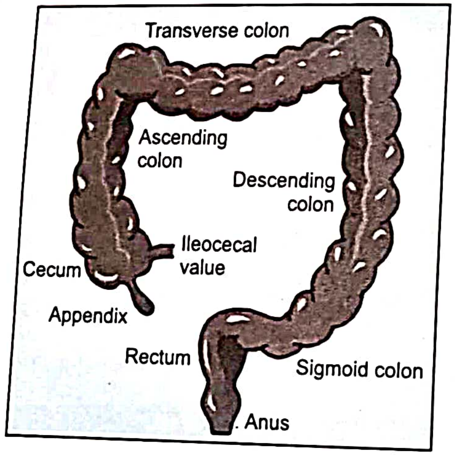


Fig 12.17: Large intestine

- ⇨ Caecum with appendix
- ⇨ Ascending colon
- ⇨ Transverse colon
- ⇨ Descending colon
- ⇨ Sigmoid colon
- ⇨ Rectum
- ⇨ Anal canal

Functions of large intestine

- ⇨ **Absorptive function:** Absorption of water and electrolytes from chyme to form faeces,[180] nearly around 1500 ml of chyme will be coming into large intestine at ileo caecal junction in 24 hours and around 100 ml of fluid will be excreted in the faeces.
- ⇨ **Storage function:** Storage of faecal matter until it can be expelled. When the chyme enters the ileo caecal junction, the consistency will be of liquid, the when it reaches the hepatic flexure of colon, it will be of semifluid consistency and when reaches middle of transverse colon, its consistency will be of mush and when food residue reaches the splenic flexure of colon, then consistency will be of semimush and when the food residue reaches the sigmoid colon, the consistency will be of semisolid and when the food residue reaches the rectum, the consistency will be of solid consistency.
- ⇨ **Excretory function:** Large intestine excretes heavy metals like mercury, lead, bismuth and arsenic through faeces.
- ⇨ **Secretory function:** Large intestine secretes mucin and inorganic substances like chlorides and bicarbonates.
- ⇨ **Synthetic function:** The bacterial flora of large intestine synthesises folic acids, vitamin B12 and vitamin K, by this function, large intestine contributes in the erythropoietic activity and blood clotting mechanism.

Composition of faeces

Faeces consists of 75% of water and 25% of solid portion. Among the solid portion, 30% is composed of dead bacteria, 10 to 20% fat, 10 to 20% inorganic matter, 2 to 3% proteins, 30% of undigested roughage from food and dried constituents of digestive juices such as bile pigments and sloughed epithelial cells.

The brown colour of faeces is due to the presence of stercobilin and urobilin the derivatives of bilirubin.

The odour is caused by products of bacterial action. These vary from person to person depending upon the colonial bacterial flora and on the type of food consumed. The odoriferous products present in faeces include indole, skatole, mercaptans and hydrogen sulphide.

Defaecation

Voiding the faecal matter to the exterior from the body is termed as defaecation. Faeces is formed in the large intestine and stored in sigmoid colon. Most of the time, the rectum is empty of faeces. This is due to two factors:

1. Weak functional sphincter exists about 20 centimeters from the anus at the junction between sigmoid colon and rectum
2. Sharp angulation present at the junction between sigmoid colon and rectum

When mass movement, a special type of movement of large intestine, a stimulus for the initiation of stimulus for defaecation, induces the reflex contraction of rectum and relaxation of anal sphincters, leading to the faecal matter will be expelled from rectum to the exterior through anus.

Common diseases involving large intestine

- ⇨ **Inflammatory bowel disease (IBS):** this includes Crohn's disease and ulcerative colitis. Both are relapsing and remitting condition characterised by chronic inflammation at various sites in the gastrointestinal tract.
  - ☐ **Crohn's disease** – is a chronic transmural inflammatory disease that usually affects distal ileum and colon, but may occur in any part of the alimentary canal. Symptoms include pain in abdominal region and diarrhoea. Abscesses, internal and external fistulas and bowel obstruction may occur. Extra intestinal symptoms, multiple joint pain occur in particular in the form of arthritis may occur. Diagnosis is done by colonoscopy.
  - ☐ **Ulcerative colitis** – chronic inflammatory disease and ulcerative disease arising in colonic mucosa. This is characterised by diarrhoea mixed with blood. Extra intestinal symptoms, multiple joint pain in particular in the form of arthris may occur. Diagnosis is done by colonoscopy.
- ⇨ Certain ano rectal diseases such as anal fissure, ano rectal abscess, haemorrhoids can be observed.
  - ☐ **Anal fissure**–acute longitudinal tear or a chronic ovoid ulcer in the squamous epithelium of the anal canal. It causes very severe pain after defaecation and sometimes associated with bleeding. Diagnosis is done by inspection, it is associated with sentinel pile.
  - ☐ **Ano rectal abscess** – is a localised collection of pus in the perianal region. Symptoms are pain and swelling. Diagnosis is by examination and CT or pelvic MRI for deeper abscesses.
  - ☐ **Haemorrhoids** are dilated veins of the haemorrhoidal plexus in the lower rectum. The person suffering from this disease will be presented with irritation, bleeding and in case of thrombosed veins, associated with severe pain. Diagnosis is done by inspection.

Svedavaha Srotas

- ⇨ As per *Caraka*, it is 13th *Srotas*. *Sushruta* did not mention this *Srotas*.
- ⇨ It is one of the important Mala (excretory product) of the human body.
- ⇨ As per *Dhatu Parinama*, *Sveda* is formed as a biproduct of metabolism of *Medo Dhatu*.

Svedavaha Srotomula

स्वेदवहानां स्त्रोतसां मेदो मूलं लोमकूपाश्च। च.वि. - 5/8

GK

intestinal adhesions which will limit the movement of the intestines.

[180] Faeces consists of 75% of water and 25% of solid portion. Among the solid portion, 30% is composed of dead bacteria, 10 to 20% fat, 10 to 20% inorganic matter, 2 to 3% proteins, 30% of undigested roughage from food and dried constituents of digestive juices such as bile pigments and sloughed epithelial cells. The brown colour of faeces is due to the presence of stercobilin and urobilin the derivatives of bilirubin. The odour is caused by products of bacterial action. These vary from person to person depending upon the colonial bacterial flora and on the type of food consumed. The odoriferous products present in faeces include indole, skatole, mercaptans and hydrogen sulphide.

As per *Caraka*, the sites of origin of *Svedavaha Srotas* are *Medas* (adipose tissue) and *Lomakupa* (hair follicles). *Sushruta* did not describe the *Svedavaha Srotas*.

Causes of affliction of Svedavaha Srotas

व्यायामादतिसंतापाच्छीतोष्णाक्रमसेवनात्।
स्वेदवाहीनि दुष्यन्ति क्रोधशोकभयैस्तथा॥2 2॥

Ca.Vi. – 5/22

- *Vyayama* (excess exercise)[181];
- *Ati santapa* (excess exposure to sunlight)[182];
- *Shita* and *Ushna Akrama Sevana* (abnormal or disproportionate exposure to cold and hot substances)[183];
- *Krodha* (anger)[184];
- *Soka* (grief) and
- *Bhaya* (fear)

Symptoms of affliction of Svedavaha Srotas

प्रदुष्टानां तु खल्वेषामिदं विशेषविज्ञानं भवति, तद्यथा अस्वेदनमतिस्वेदनं पारुष्यमतिश्लक्ष्णतामङ्गस्य परिदाहं लोमहर्षं च दृष्ट्वा स्वेदवहान्यस्य स्रोतांसि प्रदुष्टानीति विद्यात्।

च.वि. - 5/8

- *Asvedana* (little or negligible amount of perspiration)[185];
- *Atisvedana* (excess perspiration);
- *Parushya* (roughness of skin)[186];
- *Atishlakshnata* (excess sliminess of skin and body parts)[187];
- *Paridaha* (burning sensation of skin)[188];
- *Lomaharsha* (horripulation)[189]

GK

[181] Excess exercise is responsible for
1. Enhanced basal rate of metabolism in all cells of the body
2. Extra rate of metabolism caused by muscle activity
3. Extra metabolism caused by effect of epinephrine, norepinephrine and sympathetic nervous *stimulation*
4. Enhanced metabolism caused by increased chemical activity in the cells

All above mechanisms are responsible for increased peripheral circulation and thus excess heat produced will be lost along with sweat.

[182] This will reduce the transfer of heat generated in the body to the exterior. This is responsible for
1. Increased basal metabolism in all the cells of the body
2. Extra metabolism caused by increased chemical activity in the cells, especially the temperature of the cell increases

[183] This type of exposure is responsible for the alternate stimulation of peripheral *vaso* constriction and dilatation. Thus, it is leading to abnormal production of sweat.

[184] Frequent mood changes in either anger, grief and fear or in any particular state of mind is responsible for the activation of sympathetic nervous system, and increased production of hormones of adrenal medulla thereby is responsible for peripheral *vaso* constriction, thus leading to the less sweat production.

[185] Concept of *Asvedana* and *Atisvedana* are described in the context of *Sveda Vriddhi* and *Kshaya Lakshana*.

[186] Roughness of the skin is attributable to the absence of sweating. This is considered to be due to
1. Reduced blood supply to the skin because of vasoconstriction of blood vessels supplying the skin
2. Decreased production of the heat in the body

[187] Normally, when the person will have 600 – 700 ml of sweat in 24 hours; where as when the person is exposed to hot weather for a period of 1-6 weeks, then the person is presented with huge amount of sweat with an amount of 2-3 liters/ hour. This is usually responsible for the moistness of the skin for most of the time.

[188] Excess sweating usually observed in case of any conditions where raised body temperature is observed or any condition where vasodilatation of skin blood vessels, excess sweating and decreased production of body temperature secondary to increased body temperature. Because of loss of temperature loss from the skin, the person may present with burning sensation of the skin.

[189] Horripulation can be seen in case of cold environment. Along with pilo erection, vasoconstriction of blood vessels of the skin and increase in production of temperature by altering in the physiological function of metabolic system.

Sweating

- Sweat glands are the small tubular structures of the skin that produce sweat. There are two types of sweat glands are present namely, eccrine and apocrine sweat gland.

Table 12.3: Characters of eccrine and apocrine glands

Eccrine gland	Apocrine gland
Present throug-hout the skin	Present in axilla and pubic region
It regulates body temperature	Stimulates during emotional stress and sex
Onset is soon after birth	
Functional throughout life	Non functional till puberty
Functions under nervous control	Functions under hormonal control

- Sweat gland is a tubular structure consisting of two parts:
  - (1) a deep subdermal coiled portion that secretes sweat and
  - (2) a duct portion that passes outwards through the dermis and epidermis of the skin.

Sweat glands: (Lomakupa)

- The secretory portion of sweat gland secretes a fluid called primary secretion or precursor secretion; the concentration of components of the primary secretion may vary as the fluid moves throught the duct portion of the sweat gland. The precursor secretion is an active secretory product of epithelial cells lining the coiled portion of the sweat gland. This is mediated by cholinergic sympathetic nerve fibres of glandular cells of sweat gland.
  - ☐ The composition of the precursor secretion is similar to plasma, except that it does not contain plasma proteins. The concentration of sodium is about 142 mEq/L and that of chloride is about 104 mEq/L, with much smaller concentrations of other solutes of plasma. As this precursor secretion flows through the duct portion of sweat gland, sodium and water reabsorption takes place.
- When sweat glands are stimulated strongly by sympathetic nervous system, then large amount of precursor secretion is formed by the glandular cells and the duct portion of sweat gland will reabsorb only little bit more than 50% of the precursor secretion. Thus, more sweat is formed.

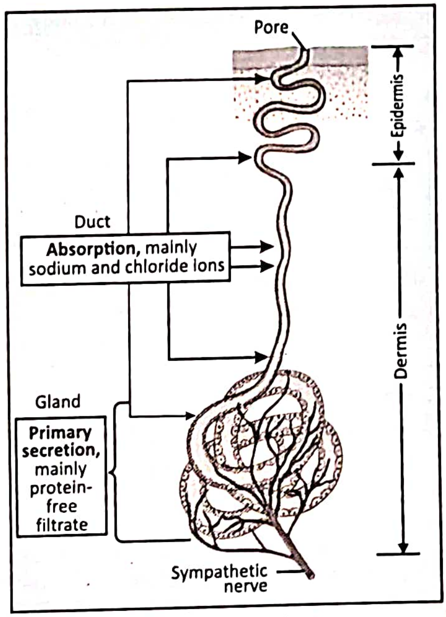
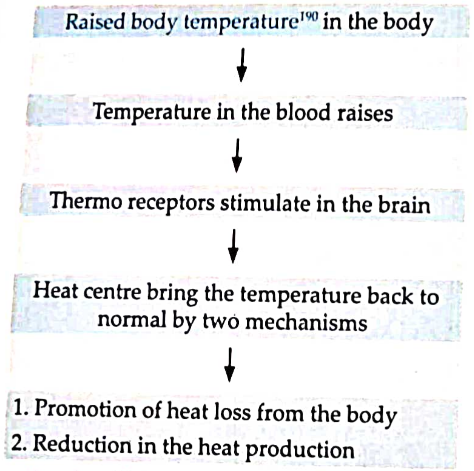

Pore
Epidermis
Duct
Absorption, mainly sodium and chloride Ions
Dermis
Gland
Primary secretion, mainly protein-free filtrate
Sympathetic nerve

Fig 12.18: Sweat glands

Adipose tissue (Medas)

- Adipose tissues are derived from fibroblast that are specialised for storage of triglycerides as large centrally located droplet fills up with a single large triglyceride droplet and cytoplasm and the nucleolus are pushed to the periphery. As a result of this, the weight of the adipose tissue increases and a new blood vessel is *formed. Thus, an obese person has many blood vessels than a normal person.*

- ⇨ *It is a thick layer present beneath the skin, around the kidneys and buttocks.*
  - ☐ *It functions as an insulating layer and help to reduce heat loss through skin.*
  - ☐ *It also has protective functions, providing mechanical protection and support some of the major organs such as kidneys.*
  - ☐ It also acts as energy reservoir.



Raised body temperature[190] in the body
Temperature in the blood raises
Thermo receptors stimulate in the brain
Heat centre bring the temperature back to normal by two mechanisms
1. Promotion of heat loss from the body
2. Reduction in the heat production

Flowchart 12.1: mechanism of regulation of body temperature

- ⇨ Wearing is one of the mechanism from which heat loss[191] occurs which is generated in deeper organs such as liver, brain, heart and skeletal muscles during exercise. From these organs, the heat is transferred from deeper organs to the skin, where it is lost to the air and surroundings.
- ⇨ Fluid loss in sweat: the amount of water lost by sweating is highly variable, depending upon the physical activity and environmental temperature. Normal volume of sweat is about 100 ml/ day, in very hot weather or during heavy exercise, the water loss from sweat increases to 1 to 2 liter/ hour. This is responsible for rapid depletion of body fluids[192].

Artavavaha Srotas

Artavavaha Srotomula

आर्तववहे द्वे, तयोर्मूलं गर्भाशयो आर्तववाहिन्यश्च धमन्यः।

सु.शा. - 9/12

As per *Sushruta, Artavavaha Srotas* are two in number and their sites of origin are *Garbhashaya* (uterus) and *Artavavahi Dhamani* (channels which carry *Artava*). *Caraka* did not mention about the description of *Artavavaha Srotas.*

Causes of Artavavaha Srotodushti

याऽत्यर्थं सेवते नारी लवणाम्लगुरूणि च।
कटून्यथ विदाहीनि स्निग्धानि पिशितानि च॥205॥
ग्राम्यौदकानि मेद्यानि कृशरां पायसं दधि।
शुक्तमस्तुसुरादीनि मजन्त्याः कुपितोऽनिलः॥206॥
रक्तं प्रमाणमुत्क्रम्य गर्भाशयगताः सिराः।
रजोवहाः समाश्रित्य रक्तमादाय तद्रजः॥207॥

Ca.Ci. – 30/205-207

- ⇨ Excess consumption of *Lavana* (salt), *Amla* (sour), *Katu* (pungent) *Rasa* and *Guru* (heavy to digest), *Snigdha* (unctuous) substances
- ⇨ Excess consumption of substances having

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[190] 2 mechanisms: increased heat production and reduced heat loss from the body
Raised heat production can happen because of several following mechanisms:
1. Raised basal metabolic rate of all cells of the body
2. Extra rate of metabolism by muscular activity
3. Extra metabolism caused by thyroxine on the cells
4. Extra metabolism caused by epinephrine, norepinephrine and sympathetic stimulation on cells
5. Extra metabolism caused by increased chemical activity inside the cells
6. Extra metabolism needed for digestion, absorption and storage of food

[191] Heat loss from the body can occur either by radiation, conduction, convection and evaporation.

[192] Water loss from respiratory passages averages about 300 to 400 ml per day. Fluid loss from faecal matter is about 100 ml/ day. Water loss from the kidneys averages about 1200 to 1500 ml/ day.

Vidahi property (the quality responsible for burning sensation in the chest association with thirst and dryness of mouth)

- ⇨ Excess consumption of *Gramya* (domestic animals), *Audaka* (aquatic animals) and *Anupa* (marshy animals) meat
- ⇨ Excess intake of fatty substances, milk and milk products, curds and products prepared by curds, fermented products

Symptoms of injury to Artavavaha Srotas

तत्र विद्धायां वन्ध्यात्वं मैथुनासहिष्णुत्वमार्तवनाशश्च॥

सु.शा. - 9/12

- ⇨ *Vandhyatva* (sterility)[193];
- ⇨ *Maithuna Asahishnutva* (painful sexual intercourse)[194];
- ⇨ *Artavanasha* (absence of menstruation)[195]

Female reproductive system

The principal organs of human female reproductive system include a pair of ovaries, a pair of fallopian tubes, uterus, vagina.

- ⇨ **Ovaries:** Reproduction begins with the development of ova[196] in the ovaries. In the middle of each monthly menstrual cycle, a single ovum is expelled out from an ovarian follicle into the abdominal cavity near the open fimbriated ends of the fallopian tubes.
- ⇨ **Fallopian tubes and uterus:** ovum passes from the ovarian end of the fallopian tube towards the uterus. If fertilised by the sperm at the ampulla of fallopian tube, zygote will be formed and this zygote moves towards the uterus where implantation of zygote will occur, later there will be development into fetus, placenta and fetal membranes and eventually into the baby.
- ⇨ **Vagina:** is a tubular structure which has the following functions.
  - ☐ Passage of menstrual blood[197] during the menstrual cycle
  - ☐ Passage of tremendous number of leucocytes along with necrotic material and blood
  - ☐ Becomes a receptacle for the phallus during the act of copulation
  - ☐ Passage of full term baby at the time of gestation

Female reproductive functions can be divided into 2 major phases:

1. Preparation of female body for conception and pregnancy
2. The period of pregnancy

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[193] This can be attributable to infertility that can happen because of following reasons. These are the probable causes which may lead to injury to female reproductive system
1. Use of intrauterine contraceptive device
2. Lower abdominal surgery leading to pelvic adhesions
3. Ectopic pregnancy
4. Intrauterine adhesions

[194] This can be attributable to improper episiotomy wound healing

[195] This is attributable to secondary amenorrhoea. The probable causes of secondary amenorrhoea due to injury to female reproductive system are
1. Intrauterine adhesions (Asherman's syndrome)
2. Cervicovaginal outflow blockage

[196] During all reproductive life between 13 to 46 years, 400 to 500 of primordial follicles develop enough to expel their ova once in a month; the remainder become degenerate.
During the period of ovulation, nearly 5 to 12 follicles begin to grow, but one of the follicle will overgrow than others and rest of the follicles will be degenerated.

[197] During normal menstruation, approximately 40 ml of blood and an additional 35 ml of serous fluid are lost. The menstrual blood is usually non clotting due to the presence of fibrinolysin which is released along with necrotic endometrial material. The presence of clots during menstruation is usually indicative of uterine pathology.

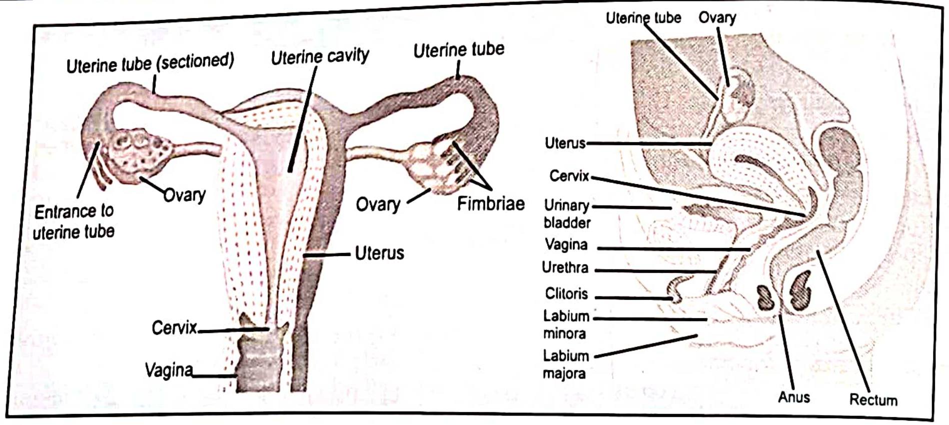


Fig 12.19: Female reproductive system

Clinical application of Srotas:

Each and every symptom in the patient has to be assessed depending upon the involvement of *Srotas* with the type of *Srotodushti* involved in the pathogenesis. Below are the few examples to illustrate the application of *Srotodushti* understanding.

- 21 years old male patient is presented with paroxysmal cough with yellowish coloured sputum from the past 2 weeks implies that there is involvement of *Pranavaha Srotas* with *Sanga* and *Vimargagamana* as the type of *Srotodushti*.
- 31 years old male patient is presented with pain in lower abdomen followed by loose stools is suggestive of the involvement of *Purishavaha Srotas* with *Atipravritti* as the type of *Srotodushti*.
- 52 years old male patient is presented with non radiating pricking type of pain in right knee joint worsening on movement of joint and getting relief by rest implies the involvement of *Asthi* and *Majjavaha Srotas* with *Sanga* and *Vimargagamana* as the type of *Srotodushti*.
- 60 years old female patient is presented with non radiating burning type of pain in the epigastrium and sour eructations implies the involvement of *Annavaha* and *Pranavaha Srotas* with *Sanga* and *Vimargagamana* as the type of *Srotodushti*.
- 45 years old male patient is presented with visible varicose veins in both lower limbs. It implies that the individual is having the involvement of *Raktavaha Srotas* with *Siragranthi* as the type of *Srotodushti*.

Chapter Resources

1. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders Publications, 2006
2. Textbook of pathology by Harshmohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
3. Harrison's principles of internal medicine by Anthony S Fauci and Eugene Braunwald et al, 17th Edition, McGraw Hill medical publication, New Delhi, 2008
4. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya excerpts
5. Website materials

Key points of the chapter

- सु स्रावणे This has different meanings – to exude, to ooze, to filter or to permeate. Because of the function of Sravana, these are called as Srotas.
- स्रवणात् स्रोतांसि। च.सू. - 30/12 Srotas is the channel which helps in transportation of substances such as nutrients and metabolites to different cells and tissues.
- As far as characters of Srotas are concerned, स्वधातु समवर्णानि वृत्तस्थूलान्यणूनि च। स्रोतांसि दीर्घाण्याकृत्या प्रतानसदृशानि च।। च.वि. - 5/25 Srotas will have same colour of the Dhatu in which they circulate in entire body; some Srotas will have circular in nature; some are big and some are small and some are having reticular in nature.
- As far as types of Srotas are concerned, two types – Bahya and Abhyantara both as per Charaka and Sushruta. Bahya Srotas are 9 in number, namely two eyes, two ears, two nostrils, one oral cavity, one anus and one urethral orifice and in females, 3 additional Srotas are present – two breasts and one vaginal orifice. As far as Abhyantara Srotas are concerned, 13 Srotases are mentioned by Charaka (Pranavaha, Udakavaha, Annavaha, respective Dhatuvaha, Mutravaha, Purishavaha and Svedavaha) and 11 pairs are mentioned by Sushruta (Pranavaha, Udakavaha, Annavaha, Rasavaha, Raktavaha, Mamsavaha, Medovaha, Shukravaha, Mutravaha, Purishavaha, Artavavaha).
- Srotomula can be afflicted in due course of time sooner or later, if one is observing the affliction of Srotas. Depending upon the site of Srotas involvement, we can predict the possible involvement of Srotomula.
- As far as the causative factors of Samanya Srotodushti are concerned, आहारश्च विहारश्च यः स्याद्दोषगुणैः समः। धातुभिर्विगुणश्चापि स्रोतसां स प्रदूषकः।। Ca.Vi. – 5/23 Diet and regimen which has the qualities similar to Dosha and which are responsible for the abnormality of Dhatu are considered as Nidana of Samanya Srotodushti.
- अतिप्रवृत्तिः सङ्गो वा सिराणां ग्रन्थयोऽपि वा। विमार्गगमनं चापि स्रोतसां दुष्टिलक्षणम्।। Ca.Vi. – 5/24 Atipravritti (excessive movement in natural course such as urethra, anus, vagina and eyes); Sanga (obstruction); Siragranthi (swelling arising from vessels) and Vimargagamana (deviation in the movement of Dosha or Dushya than usual movements of these elements in the body) are Samanya Srotodushti Lakshana. These are also called as Samanya Srotodushti Prakaras.
- As far as Srotoviddha (injury to Srotas) Lakshana are concerned, व्यधे तु स्रोतसां मोहकम्पाध्मानवमिज्वराः। प्रलापशूलविण्मूत्ररोधा मरणमेव वा।। स्रोतोविद्धमतो वैद्यः प्रत्याख्याय प्रसाधयेत्। उद्धृत्य शल्य यत्नेन सद्यःक्षतविधानतः।। A.Hr.Sha. – 3/47-48 altered state of consciousness, vomiting, fever, irrelevant speech, pricking type of pain, obstruction of urine and faecal matter and death are observed.
- Individual Srotas mula (origin of Srotas), Srotodushti Karana (causative factors of affliction of Srotas), Srotodushti Lakshana (clinical features of affliction of Srotas), Srotoviddha Lakshana (clinical features in case of injury to individual Srotas) and their interpretation in current era is elaborated in this chapter.

Probable questions may be asked in the examination

Long essays

⇨ Define Srotas, explain the synonyms of Srotas, write the Svarupa of Srotas, Samanya Srotodushti Karana and Samanya Srotodushti Lakshana with relevant examples

⇨ Define Srotas, write the Srotomula of different Srotas as per Charaka and write Pranavaha Srotodushti Karana and Pranavaha Srotodushti Lakshana

⇨ Write Rasavaha Srotomula, Rasavaha Srotodushti Karana and Rasavaha Srotodushti Lakshana

⇨ Explain Samanya Srotodushti Nidana and Samanya Srotodushti Lakshana of Srotas

⇨ Explain the concept of Srotas and write the importance of Srotovaigunya in Vyadhi Nirmana

⇨ Discuss the Srotodushti Hetu, Lakshana and Pariksha of Mutravaha Srotas

⇨ Define Srotas. Write in detail about the Mulas of all Srotas and explain Samanya Srotodushti Hetu

⇨ Define Srotas. Write its synonyms, classification, Samanya Srotodushti Karana and Dushti Lakshana in detail

⇨ Define Srotas. Explain Srotomula and their importance. Explain Srotodushti Lakshana with examples

⇨ Define Srotas. Explain the examination of Pranavaha Srotas (respiratory system)

⇨ Define Srotas explain Srotodushti Nidanas and Lakshana of Pranavaha Srotas, Purishavaha Srotas, Raktavaha Srotas, Annavaha Srotas

⇨ Explain Samanya Srotodushti Nidana and Lakshana. Write Pranavaha, Annavaha, Udakavaha Srotodushti Nidana and Lakshana

⇨ Describe Srotas and its Dushti Lakshana. What is Khavaigunya?

⇨ Describe Dushti Hetu and Lakshana of Annavaha Srotas with its clinical examination methods

⇨ Write Raktavaha Sroto Mulasthana, Dushti Hetu and Dushti Lakshana and explain clinical examination and laboratory investigations used for Raktavaha Srotas.

Short essays

⇨ Sroto Vivarana

⇨ Kha Vaigunya

⇨ Write Asthivaha Srotodushti Karana and Asthivaha Srotodushti Lakshana

⇨ Write Samanya Srotodushti Karana with suitable examples

⇨ Write Samanya Srotodushti Lakshana (Prakara) with suitable examples

⇨ Explain Rasa Pradoshaja Vikara

⇨ Explain Rakta Pradoshaja Vikara

⇨ Srotodushti Karana and Srotodushti Lakshana of any Srotas other than Rasavaha and Raktavaha Srotas

⇨ What are the differences between Khavaigunya and Srotodushti, explain with examples?

⇨ Describe Mamsavaha Srotodushti Lakshana

⇨ Explain Annavaha Srotodushti Karana and Lakshana

⇨ Describe Purishavaha Srotodushti Nidana and Lakshana

⇨ Write Samanya Srotodushti Karana and Lakshana

⇨ Explain Annavaha Srotodushti

⇨ Mutravaha Srotodushti

⇨ Write Raktavaha Srotodushti Hetu and Lakshana

⇨ Write Mulasthana of Pranavaha Srotas and explain Srotodushti Karana and Lakshana of Pranavaha Srotas

Short answers

⇨ Write the Srotomula of Pranavaha Srotas or any Srotas

⇨ Pranavaha Srotodushti Hetu

⇨ Write Asthivaha Srotodushti Hetu

⇨ Write the difference between Khavaigunya and Srotodushti

⇨ Write Samanya Srotodushti Nidana

⇨ What are Samanya Srotodushti Karanas?

⇨ Write Samanya Srotodushti Prakara (Lakshana)

⇨ Write Udakavaha Srotodushti Nidana

⇨ Write Shukravaha Srotodushti Lakshana

⇨ What is Khavaigunya?

⇨ What is Srotodoshti?

⇨ Write the synonyms/ Paryayas of Srotas

⇨ Define Srotas

⇨ Explain Atipravritti with suitable examples

⇨ Mutravaha Srotodushti Lakshana

⇨ Medovaha Srotodushti Lakshana

⇨ Majjavaha Srotodushti

⇨ Rasavaha Srotodushti Lakshana

⇨ Annavaha Srotodushti

⇨ Mamsavaha Srotodushti Hetu

⇨ Mamsavaha Srotodushti Lakshana

⇨ Write Mamsavaha Srotodushti Lakshana

MCQs

1. **Hridaya is the Srotomula of**
   a. Pranavaha Srotas;
   b. Rasavaha Srotas;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
2. **Abhishyandi Bhojana is the causative factor of which of the following Srotodushti?**
   a. Mamsavaha Srotas;
   b. Majjavaha Srotas;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
3. **Medas is the Srotomula of**
   a. Asthivaha Srotas;
   b. Svedavaha Srotas,
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
4. **Klaibya is the Srotodushti Lakshana observed in .... Srotodushti.**
   a. Rasavaha;
   b. Shukravaha;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
5. **Vankshana is the Srotomula of .... Srotas.**
   a. Shukravaha;
   b. Mutravaha;
   c. Purishavaha;
   d. Mamsavaha
   Answer -(b)
6. **Asthi and Sandhi are considered as Srotomula of .... Srotas.**
   a. Asthivaha;
   b. Medovaha;
   c. Mamsavaha;
   d. Majjavaha
   Answer -(d)
7. **As per Charaka, which of the following is not considered as Samanya Srotodushti?**
   a. Atipravritti;
   b. Apravritti;
   c. Sanga;
   d. Siragranthi
   Answer -(b)
   d. None of the above
   Answer -(c)
4. **Klaibya is the Srotodushti Lakshana observed in .... Srotodushti.**
   a. Rasavaha;
   b. Shukravaha;

c. Both 1 and 2;
d. None of the above
Answer -(c)

5. **Vankshana is the Srotomula of ……………… Srotas.**
a. Shukravaha;
b. Mutravaha;
c. Purishavaha;
d. Mamsavaha
Answer -(b)

6. **Asthi and Sandhi are considered as Srotomula of ……………. Srotas.**
a. Asthivaha;
b. Medovaha;
c. Mamsavaha;
d. Majjavaha
Answer -(d)

7. **As per Charaka, which of the following is not considered as Samanya Srotodushti?**
a. Atipravritti;
b. Apravritti;
c. Sanga;
d. Siragranthi
Answer -(b)

8. **Gulma is manifested in the individual because of the affliction of …………… Srotas.**
a. Rasavaha;
b. Raktavaha;
c. Mamsavaha,
d. Medovaha
Answer -(b)

9. **Total number of Bahirmukha Srotas in females is**
a. 12;
b. 9;
c. 13;
d. 10
Answer -(a)

10. **Total number of Abhyantara Srotas as per Sushruta is**
a. 11;
b. 11 pairs;
c. 13;
d. 13 pairs
Answer -(b)

11. **The Srotas not mentioned by Sushruta is**
a. Asthivaha Srotas;
b. Majjavaha Srotas;
c. Svedavaha Srotas;
d. All of the above
Answer -(d)

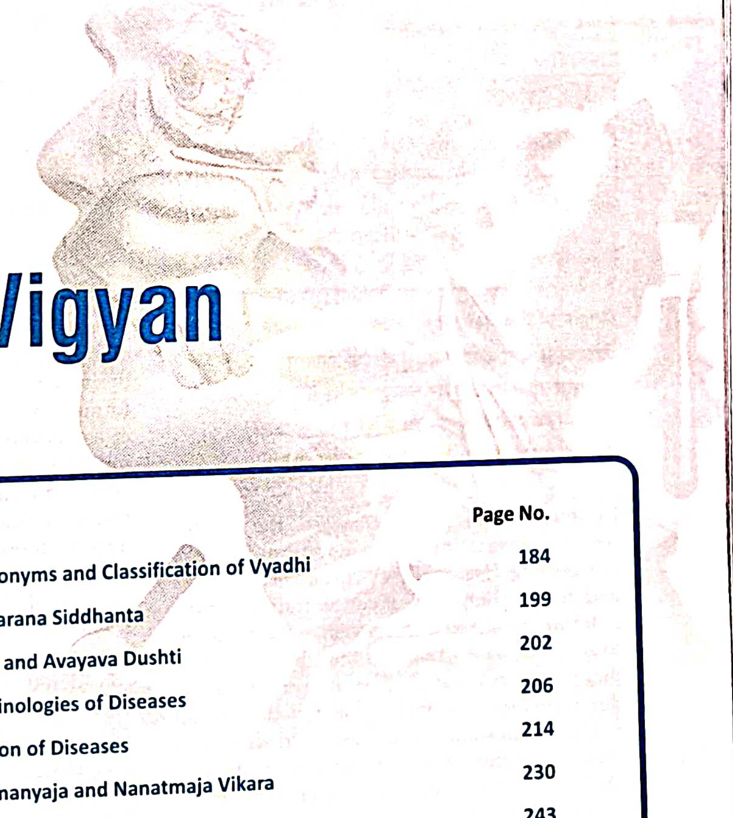
12. **The percentage of blood present in veins in the cardiovascular system is**
a. 13%;
b. 7%;
c. 64%;
d. 9%
Answer -(c)

13. **The amount of urine passed in 24 hours in a patient of polyuria is**
a. 600 ml;
b. 2,500 ml;
c. 3,000 ml;
d. 250 ml
Answer -(c)

14. **Total quantity of lymph formed in 24 hours in a normal individual is**
a. 1 to 2 liters;
b. 5 to 6 liters;
c. 7 to 8 liters;
d. 2 to 3 liters
Answer -(d)

15. **Akroshana is the Lakshana seen in injury of ………… Srotas.**
a. Udakavaha;
b. Pranavaha;
c. Asthivaha;
d. Majjavaha
Answer -(b)

***



SECTION - II

Vyadhi Vigyan

With G.K.'s Opinion

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Definition, Synonyms and Classification of Vyadhi

1

Learning objective

- ⇨ Understanding the definition, synonyms described in classics of Ayurveda
- ⇨ To understand the rationale behind the several classifications of diseases in Ayurveda
- ⇨ To assess the Rogabala and Rogibala which in turn helps in the proper management of the disease

Origin of the disease

विघ्नभूता यदा रोगाः प्रादुर्भूताः शरीरिणाम्।
तपोपवासाध्ययनब्रह्मचर्यव्रतायुषाम्॥6॥
तदा भूतेष्वनुक्रोशं पुरस्कृत्य महर्षयः।
समेताः पुण्यकर्माणः पार्श्वे हिमवतः शुभे॥7॥

Ca.Su. – 1/6-7

In ancient times in *Kritayuga*, the people were following rituals, religious duties like performing *Homa*, *Tapa*, *Adhyayana*, *Upavasa* and so on. High level of concentration, strong determination and a sharp vision was required to achieve above rituals. As the advent of times, there was gradual decline in concentration, determination and vision was noted. This led to the manifestation of diseases. On account of this, destruction and deterioration in human ability started once the disease started evolving. Gradually, the people started observing decline in physical strength, mental stamina, life span and overall performances and it became a major concern for the achievement of these intellectuals. This obstacle was called as *Roga* which was responsible for various varieties of discomfort ranging from trivial discomfort to fatal outcome such as death.

Derivation of Vyadhi

विविधं दुःखमादधातीति व्याधिः॥ चक्र, च.नि. - 1/5
विविधं दुःखमादधातीति शरीरे मनसि चेति व्याधिः॥

अरुणदत्त, अ.हृ.नि. 1/1

Vyadhi is defined as any kind of discomfort observed in the body and mind. As per this derivation, if the person is presented with formed stools every day is normal and if it is associated with the passage of unformed, semisolid stools, then it is abnormal or passing very hard stools passing once in four days, then it is abnormal. Passage of blood or mucus mixed stools is also considered as *Vyadhi*. Presence of pain around anal region after the passage of the stools is considered as *Vyadhi*. Feeling of sadness when one person is losing dear one, is a kind of mental discomfort, is considered as *Vyadhi*.

Definition of Vyadhi

तद्दुःखसंयोगा व्याधय उच्यन्ते॥ सु.सू. - 1/23
दुःखं कायवाङ्मानसि पीडा, विविधं दुःखमादधातीति व्याधयः॥ ड. सु.सू 1/23
दोषदूष्यसम्मूर्च्छनाजनितो व्याधिः, तत्कार्यश्चारुच्यादयः॥

मधु, मा.नि. - 1/7

रोगस्तु दोषवैषम्यं, दोषसाम्यमरोगता। A.Hr.Su. – 1/20
विकारो धातुवैषम्यं, साम्यं प्रकृतिरुच्यते।
खसंज्ञकमारोग्यं, विकारो दुःखमेव च॥4॥ Ca.Su. – 9/4

As per *Sushruta*, the group of discomfort is considered as *Vyadhi*. *Dalhana* added discomfort may be of either related to *Kaya* (physical) such as *Jvara* (raised body temperature), *Vachika* (speech related) such as *Ardita* (irrelevant and incomprehensible speech) and *Manasika* (mental) such as *Atatvabhinivesha* (delusion). As per *Madhukosha* commentary, disease is nothing but amalgamation of *Dosha* and *Dushya* in susceptible part of the body.

It is a well known fact that the health is considered as the balanced as well as controlled equilibrium of the *Doshas*. Any disequilibrium in any level of *Dosha* results in the manifestation of disease. The disequilibrium occurs due to change in diet and lifestyle. The mechanism of the changes in diet and lifestyle leading to the manifestation of the disease is being discussed elsewhere in the textbook. Depending upon the nature of the causative factor, nature of the manifestation of the disease, prognosis of the disease diseases are classified in several ways. In this chapter, we are going to discuss these classifications elaborately. If you keenly observe the details of these classifications, all are justifiable and reasonable. In the following pages, we will look into the different classifications and its rationale as well as relevance in present context.

Before the discussion of classification of *Vyadhi*, let us have a brief description of manifestation of the disease and its relation to *Nidana*, *Dosha* and *Dushya*.

इह खलु निदानदोषदूष्यविशेषेभ्यो विकारविघात-भावाभावप्रतिविशेषा भवन्ति।
यदा ह्येते त्रयो निदानादिविशेषाः परस्परं नानुबध्नन्त्यथवा काल-प्रकर्षादबलीयांसोऽथवाऽनुबध्नन्ति न तदा विकाराभिनिर्वृत्तिः, चिराद्वाऽप्यभिनिर्वर्तन्ते, तनवो वा भवन्त्ययथोक्तसर्वलिङ्गा वा; विर्यये विपरीताः;

Ca.Ni. 4/4

If there is conducive environment for exposure to *Nidana*, abnormal proportion to *Dosha* and *Dushya*, then the effect of the *Vyadhi* on the body will be severe and if the conducive environment is not present, then the manifestation of the disease will vary from no development of symptoms to presentation of moderate *Lakshana*. The degree of manifestation of *Lakshana* are *Vikara Ajanana* (no manifestation of disease); *Anu Vikara Janana* (very mild disease); *Chirena Vikara Janana* (manifestation of disease after long time) and *Asarvalinga Vikara Janana* (disease not showing all the *Lakshana* pertaining to any particular disease). All these different clinical manifestation of a disease are attributed to the consumption of different proportion of the *Nidana*, different degrees of *Dosha Prakopa*, different degrees of *Dushya* involvement and *Bala* of the person which helps to prevent the occurrence of the disease in that individual.

Synonyms of Vyadhi

तत्र व्याधिरामयो गद आतङ्को ज्वरो विकारो रोग इत्यनर्थान्तरम्॥ च.नि. - 1/5
रोगः पाप्मा ज्वरो व्याधिर्विकारो दुःखमामयः।
यक्ष्मातङ्कगदाबाधा शब्दाः पर्यायवाचिनः॥ अ.हृ.नि. - 1/1

Synonyms of *Vyadhi* are *Amaya*, *Gada*, *Atanka*, *Jvara*, *Vikara* and *Roga*. As per *Vagbhata*, *Papma*, *Abadha* are some more synonyms of *Vyadhi*.

Now we will look into the meaning of each of the synonyms

Vyadhi

विविधं दुःखमादधातीति व्याधिः॥ चक्र, च.नि. - 1/5

Vyadhi is one which produces various kinds of discomfort and afflicts both body and mind. The description is available in the derivation of *Vyadhi*.

Amaya

प्रायेणामसमुत्थत्वात् आमय उच्यते॥ चक्र

Most of the diseases manifest due to the presence of *Ama* in the body.

Atanka

आतङ्क इति दुःखयुक्तत्वेन कृच्छ्रजीवनं करोति॥ चक्र

A person suffering from any illness with pain is likely to lead a miserable life. That is why disease is also called as *Atanka*.

Yakshma

यक्ष्मा शब्देन राजयक्ष्मवदनेकरोगयुक्तत्वं विकाराणां दर्शयति॥ चक्र

In a disease, there will be conglomeration of many diseases like *Rajayakshma*.

Jvara

ज्वर शब्देन देहमनः सन्तापकरत्वं॥ चक्र

Jvara is the one which is responsible for the warmth to the body as well as mind.

Vikara

विकारशब्देन शरीरमनसोरन्यथाकरणत्वं व्याधेः दर्शयति॥ चक्र

Changes observed in the body and mind are termed as *Vikara*.

Roga

रोगशब्देन रुजाकर्तृत्वम्॥ चक्र

Roga is the one which gives discomfort to the body.

Papma

पाप्मा इति किल सर्वे रोगाः पापस्य कर्मणः फलमिति कृत्वा पाप्मोच्यते॥ अरुण

All the diseases manifest due to sinful acts done by the individual is termed as *Papma*.

Gada

गद इव गदोऽनेककारणजन्यत्वात्।
यथा हि गदोऽनेककारणजस्तथा गदोऽपीति गदशब्दस्यार्थः॥ अरुण

Vyadhi is manifested due to the exposure to multiple aetiological factors like poison.

Abadha

आबाधा इति आसमन्तात् कायमनसोर्बाधनं पीडेत्यर्थः॥ अरुण

During diseased state, person will be afflicted with various kinds of physical and mental disturbances which lead to various kinds of physical and mental symptoms.

Types of disease

1 **type** – based on the discomfort produced; Ca.Su. 20/3, A.S.Su. 22/11

2 **types** – *Samanyaja* and *Nanatmaja Vikara* Ca.Su. 20/10

2 **types** – according to Ca.Vi. 6/3

- *Prabhava Bheda* – *Sadhya* and *Asadhya*
- *Bala Bheda* – *Mridu* and *Daruna*
- *Adhishthana Bheda* – *Shareera* and *Manasa*
- *Nimitta Bheda* – *Swadhatu Vaishamya Nimitta* and *Agantu Nimitta*
- *Ashaya Bheda* – *Amasayasamuttha* and *Pakvasayasamuttha*

2 **types** – *Anubandhya* and *Anubandha* Ca.Vi. 6/11

2 **types** – *Rajasa* and *Tamasa* Ca.Ni. – 1/4

2 **types** – *Sastrasadhya* and *Snehadikriyasadhya* Su.Su. 24/3

2 **types** – *Prakrita* and *Vaikrita* Ca.Ci. 3/-

2 **types** – *Purvakarmaja* and *Pratyutpannakarmaja* A.S.Su. 22/4

3 **types** – *Purvakarmaja, Pratyutpannakarmaja* and *Parakritakarmaja* A.S.Su. 22/4

3 **types** – *Agneya, Soumya* and *Vayavya* Ca.Ni. 1/4

3 **types** – *Nija, Agantu* and *Manasa* Ca.Su. 11/45

3 **types** – *Mridu, Madhya* and *Atimatra* A.S.Su. 22/9

3 **types** – *Adhyatmika, Adhibhoutika* and *Adhidaivika*; Su.Su. 24/4

3 **types** – *Sadhya, Yapya* and *Pratyakhyeya*; Su.Su. 35/18

3 **types** – *Oupasargika, Prakkevala* and *Anyalakshana*; Su.Su. 35/18

4 **types** – *Sukhasadhya, Kricchrasadhya, Yapya* and *Pratyakhyeya*; Ca.Su. 10/-

4 **types** – *Agantuja, Vataja, Pittaja, Kaphaja*; Ca.Su. 20/3

4 **types** – *Agantuja, Saririka, Manasika* and *Svabhavika*; Su.Su. 1/24

7 **types** – *Adibalapravritta, Janmabala-pravritta, Doshabalapravritta, Sanghatabalapravritta, Kalabalapravritta, Daivabalapravritta, Svabhavabalapravritta*; Su.Su. 24/4

7 **types** – *Ekadoshaja* – 3; *Dvandvaja* – 3; *Sannipataja* – 1; A.S.Su. 22/7

7 **types** – *Sahaja, Garbhaja, Jataja, Pidajanya, Kalaja, Prabhavaja, Svabhavaja*; A.S.Su. 22/3

रोगत्वमेकविधं भवति, रुक्सामान्यात्; Ca.Su. – 20/3

1 type based on the presence of discomfort. The discomfort may be either physical or mental or both. For example, the presence of *Santapa, Udara Utsedha; Krodha, Soka* etc. The main criterion to consider one type of *Vyadhi* is presence of discomfort in either one part of the body or whole body itself or mind. The discomfort may be related to *Sharira* or *Manas* or both.

तत्र विकाराः सामान्यजा, नानात्मजाश्च।
तत्र सामान्यजाः पूर्वमष्टोदरीये व्याख्याताः,
नानात्मजांस्त्विहाध्यायेऽनुव्याख्यास्यामः।

तद्यथा-अशीतिर्वातविकाराः, चत्वारिंशत् पित्तविकाराः,
विंशतिः श्लेष्मविकाराः॥1 0॥ Ca.Su. – 20/10

2 types based on the dominance of *Dosha* i.e. *Samanyaja* and *Nanatmaja Vikara*.[1] In case of *Samanyaja Vikara*, the *Dosha* dominance varies in different stages of any disease. The dominance of *Dosha* is same throughout the *Sanchayavastha* to *Bhedavastha* is considered as *Nanatmaja Vikara*. The dominance of *Dosha* will vary in different stage of *Kriyakala* in case of *Samanyaja Vikara*.

The number of *Nanatmaja Vikara* are as follows:

Vataja Nanatmaja Vikara – 80
Pittaja Nanatmaja Vikara – 40
Kaphaja Nanatmaja Vikara – 20

The number of *Samanyaja Vikara* as per *Caraka* is 48.

Examples for *Samanyaja Vikaras* are *Jvara, Pandu, Gulma, Svasa* etc. Examples for *Nanatmaja Vikara* are *Vipadika, Gridhrasi, Gulphagraha, Osha, Chosha, Paridaha, Dhamani Pratichaya, Nidradhikya, Gurugatrata, Mukhasrava* etc.

द्वे रोगानीके भवतः प्रभावभेदेन-साध्यम्, असाध्यं च; Ca.Vi. – 6/3

2 **types** – based on *Prabhava Bheda*[2] i.e. *Sadhya* and *Asadhya Bheda*. This type of classification was done based on curability and incurability of the illness for e.g. nature of causative factors, prodromal symptoms and symptoms, degree of *Dosha* vitiation, degree of involvement of *Dhatu*, involvement of *Srotas*, nature of *Srotodushti* present in the patient, involvement of *Rogamarga*, gender, age, presence or absence of *Upadrava*, duration of the illness and the response of the body to the medicines etc. The criteria for the curability and incurability are decided based on the description available in 10th chapter of *Sutra Sthana* of *Caraka Samhita*.

द्वे रोगानीके बलभेदेन-मृदु, दारुणं च; Ca.Vi. – 6/3

2 **types** – based on *Bala Bheda*[3] i.e. *Mrdu* and *Daruna Bheda*. This type of classification was done based on the *Rogibala* and *Rogabala*. If the *Rogibala* is more than *Rogabala*, then such type of disease is considered under *Mrdu Vyadhi*. If the *Rogabala* is more than *Rogibala*, then such type of disease is considered as *Daruna Vyadhi*. The word '*Mridu Vyadhi*' refers to the mild nature of the disease and '*Daruna Vyadhi*' refers to the severe nature of the disease. As per

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GK

[1] The main purpose of this type of classification is to plan the appropriate line of treatment. In case of *Samanyaja Vikara*, one has to plan the line of treatment of vitiated *Dosha* at a particular stage of an illness from the state of *Sanchaya* till the state of *Bheda*. Whereas in case of *Nanatmaja Vikara*, there will be association of one single *Dosha* from *Sanchaya* to *Bheda* state, treatment should be planned to pacify the specific vitiated *Dosha* throughout the course of the disease

[2] The knowledge of this type of classification will be helpful in predicting the course of the disease, prognosis of the disease and deciding the actual line of treatment, whether *Samshodhana* or *Samshamana* is needed, for how long the treatment should be taken etc.

[3] This type of classification will help in predicting the virulence of disease in the patient and thus deciding whether *Samshodhana* (purification therapy) or *Samshamana* (palliative therapy) can be given or both can be planned.

literature, *Daruna Vyadhi* occurs due to either improper medicines or avoiding the intake of the medications. Disease becomes severe and untreatable when untreated during the course of the time.

द्वे रोगानीके अधिष्ठानभेदेन-मनोऽधिष्ठानं, शरीराधिष्ठानं च; Ca.Vi. – 6/3

2 types – based on *Adhisthana Bheda*[4] i.e.

a. *Sarira Adhisthana* and

b. *Mano Adhisthana.*

Saririka Doshas – Vata, Pitta and *Kapha* will be involved in diseases afflicting *Sarira; Rajas* and Tamas will be involved in *Manasa Vikaras.* In case of *Jvara, Atisara, Vyadhi Adhisthana* is *Sharira.* In case of *Atatvabhinivesha, Manas* is *Vyadhi Adhisthana.*

द्वे रोगानीके निमित्तभेदेन-स्वधा-तुवैषम्यनिमित्तम्, आगन्तुनिमित्तं च; Ca.Vi. – 6/3

2 types – based on *Nimitta Bheda*[5] i.e. *Svadhatu Vaishamya Nimitta* and *Agantu Nimitta.* This is to determine the *Dosha Prakopa.* In case of *Svadhatu Vaishamya Nimitta Vikaras,* the *Dosha Vaishamya* is responsible for the manifestation of the *Lakshana* whereas in case of *Agantu Nimitta Vikaras,* the manifestation of *Lakshana* will occur first followed by the *Dosha Prakopa.* In *Agantuja Vikaras,* involvement of *Doshas* can be observed after the duration of 7 days.

द्वे रोगानीके आशयभेदेन-आमाशयसमुत्थं, पक्वाशयसमुत्थं चेति। Ca.Vi. – 6/3

2 types – based on *Asayabheda* i.e. *Amasaya Samuttha* and *Pakvasaya Samuttha Vikara.* This type of classification will be helpful in deciding the *Udbhava Sthana* of the disease. *Kapha* and *Pitta* dominant *Vikaras* are having the *Amasaya* as *Udbhava Sthana* and *Vata* dominant *Vikaras* are having the *Pakvasaya* as *Udbhava Sthana.* The concept of *Udbhava Sthana* is not essential in making the diagnosis. This is helpful in planning the appropriate management of diseases. For example, the *Amashaya Samuttha Vikara* are best treated by either *Vamana* or *Virechana* and the *Pakvashaya Samuttha Vikara* are best treated by *Basti* line of treatment.

तत्रानुबन्ध्यानुबन्धकृतो विशेषः-स्वतन्त्रो व्यक्तलिङ्गो यथोक्तसमुत्थानप्रशमो भवत्यनुबन्ध्यः, तद्विपरीतलक्षणस्त्वनुबन्धः। Ca.Vi. – 6/11

2 types – *Anubandhya* and *Anubandha Vikaras. Anubandhya* (primary diseases) *Vikaras* are those which are independent and have clear clinical features and show appropriate results after giving the appropriate treatment as described in textbooks of *Ayurveda. Anubandha* (secondary diseases) *Vikaras* are having opposite features as described in *Anubandhya Vikaras. Anubandha Vikaras* depend upon the *Anubandhya Vikaras* to be manifested; have indistinct clinical features. In other words, if one treats the *Anubandhya Vikara* first, the *Anubandha Vikara* will pacify normally in most of the occasions.

द्विविधाश्चापरे-राजसाः, तामसाश्च॥4॥ Ca.Ni. – 1/4

2 types – *Rajasa* and *Tamasa*[6]. This set of classification denotes the classification of *Vyadhi* related to *Manas.* In *Rajasa Vikaras,* the persons will have the unstable state of the *Manas* depicting the dominance of *Vata Dosha,* where as in *Tamasa Vikaras,* the persons will have idle state of mind depicting the dominance of *Kapha Dosha.*

द्विविधा व्याधयः शस्त्रसाध्याः स्नेहादिक्रियासाध्याश्च।
तत्र शस्त्रसाध्येषु स्नेहादिक्रिया न प्रतिषिध्यते;

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[4] This type of classification will be helpful in deciding the planning of the treatment. If the person is suffering from *Sharirika Vikara,* one should plan *Samshodhana* and *Samshamana* line of treatment and in case of Manasika Vikara, Satvavajaya line of treatment should be planned

[5] In this type of classification, in case of *Svadhatu Vaishamyaja Vikara, Dosha Pratyanika Chikitsa* (treatment to alleviate vitiated Dosha) should be planned and in case of *Agantu Nimittaja Vikara,* symptomatic treatment should be planned during 1st 7 days of the illness and after 7 days of the illness, *Dosha Pratyanika Chikitsa* can be planned.

[6] Knowledge of this set of classification will be helpful in planning Manasa Roga Chikitsa and Satvavajaya Chikitsa

स्नेहादिक्रियासाध्येषु शस्त्रकर्म न क्रियते॥3॥ Su.Su. – 24/3

2 types – ***Sastrasadhya*** and ***Snehadi Kriyasadhya.*** This set of classification denotes the type of therapeutic procedures to be employed in different diseases. As per *Susruta, Sneha* etc measures can be employed in *Sastrasadhya Vikaras* and in case of *Snehadi Kriyasadhya Vikaras,* the *Sastrakarma* are not performed. In case of *Bhagandara, Granthi* etc diseases which are usually treated by *Shastrakarma, Snehadi Kriya* (*Sneha, Vamana, Virechana* etc treatments) can be performed depending upon the stage of the disease, nature of *Dosha Prakopa, Dushya* involvement, strength of the disease and strength of the patient etc.

प्राकृतः सुखसाध्यस्तु वसन्तशरदुद्भवः।
उष्णमुष्णेन संवृद्धं पित्तं शरदि कुप्यति॥42॥
चितः शीते कफश्चैवं वसन्ते समुदीर्यते।
वर्षास्वम्लविपाकाभिरद्भिरोषधिभिस्तथा॥42॥
Ca.Chi. – 3/42-43

कालप्रकृतिमुद्दिश्य निर्दिष्टः प्राकृतो ज्वरः॥48॥
प्रायेणानिलजो दुःखः कालेष्वन्येषु वैकृतः।
Ca.Chi. 3/48

2 types – *Prakrita* and *Vaikrita*[7]. The term *Prakrita* and *Vaikrita Vikara* refers to the diseases which manifest due to natural seasonal variation of *Dosha Prakopa* occur in the body.

Vata Prakopa occurs in *Varsha Ritu.*

Pitta Prakopa occurs in *Sharat Ritu.*

Kapha Prakopa occurs in *Vasanta Ritu.*

If *Pitta Pradhana Vikara* occurs in *Sharat Ritu,* then such *Vikara* is considered to be *Prakrita Vikara* and *Pitta Pradhana Vikara* occurs other than *Sharat Ritu,* then such *Vikara* is considered to be *Vaikrita Vikara.* Similarly *Vata Pradhana Vikara* manifests during the season of *Varsha Ritu,* such *Vikara* is considered to be *Prakrita Vikara.*

The significance of *Prakrita* and *Vaikrita Vikara* lies in deciding the prognosis of the disease. *Prakrita Vikara* are considered to be *Sukhasadhya* and *Vaikrita Vikara* are considered to be *Krichrasadhya.* The exception to this rule is *Prakrita Vataja Jvara* is considered to be difficult to cure. The reason is in case of *Jvara,* the first line of treatment is *Langhana* and *Apatarpana.* These lines of treatment likely to worsen the situation in case of *Vataja Jvara* as there will be vitiation of *Vata* by adopting *Langhana* and *Apatarpana.*

त एते समासतः पुनर्द्विविधा भवन्ति।
प्रत्युत्पन्नकर्मजाः पूर्वकर्मजाश्च।
तत्र रोगोत्पत्तिं प्रतिप्रत्युत्पन्नं कर्म यदनेनैव
शरीरेण दृष्टमदृष्टञ्चोद्दिश्याऽप्तोपदिष्टानां विहितानां
प्रतिषिद्धानामननुष्ठानमनुष्ठानं वा।
जन्मान्तरातीतेन तु पूर्वम्।
तत्तु पुनर्दैवाख्यमुक्तञ्च नियतानियतभेदेन प्राक्।
तस्माद दृष्टेहतवः प्रत्युत्पन्नकर्मजाः॥ A.S.Su. 22/2

2 types – ***Purvakarmaja*** and ***Pratyutpannakarmaja.*** *Purvakarmaja* diseases are those which are manifested due to the ill deeds of the previous or past life. *Pratyutpannakarmaja* diseases are those which occur due to the ill deeds done in the present life. *Jataprameha* is the example for the *Purvakarmaja Vikara* and *Abhighataja Jwara* is the example for the *Pratyutpannakarmaja Vikara. Pratyutpannakarmaja Vikaras* will subside after the administration of the *Hetu Vyadhi Viparita Oushadha* whereas the *Purvakarmaja Vikaras* will not subside. *Purvakarmaja Vikaras* will subside only after subsidence or reduction in the effects of the ill deeds of the past life by performing *Daiva Vyapashraya Chikitsa.*

2 types – ***Nija*** and ***Agantuja. Nija Vikaras*** are those which manifest after the vitiation of *Dosha. Agantuja Vikaras* are those which will show the *Lakshana* first followed by *Dosha Prakopa.*

⇨ The time duration mentioned for the *Dosha*

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[7] Based on the *Kala* and *Bala Samprapti,* one should decide whether vitiated *Dosha* is in usual time or unusual time. When the vitiated *Dosha* is seen in its usual time, then line of treatment for that disease is comparatively easy when compared to untimely *Dosha* vitiation. Refer *Kala* and *Bala Samprapti* for the same.

Prakopa in case of *Agantuja Vikaras* is 7 days.

तत्र यथास्वं प्रतपक्षशीलनात् पूर्वेषां रोगाणामुपशमः।
सत्येव विपक्षशीलनेऽनिष्टकर्मक्षयात् दैविकानाम्।
दोषकर्मक्षयादन्येषाम्।
अन्ये पुनः प्रत्युत्पन्नं कर्म परकृतमपि वर्णयन्ति।
तच्च पराभिसंस्कारमाचक्षते।
एवञ्चाहः यदि स्वयं कृतादेवकर्मणः कार्यनिर्वृत्तिः स्यात्।
न दृष्टपुरुषान्तरकृतात्॥ A.S.Su. – 22/3

3 types – *Purvakarmaja, Pratyutpannakarmaja* and *Parakritakarmaja*. The descriptions for *Purvakarmaja* and *Pratyutpannakarmaja Vikaras* are the same as described earlier.

- ⇨ *Parakritakarmaja Vikaras* are the *Vikaras* which will manifest due to *Pratyutpanna Karma* of other people i.e deeds done by other people in the present life.

अतस्त्रिविधा व्याधयः प्रादुर्भवन्ति-आग्नेयाः, सौम्याः,
वायव्याश्च; द्विविधाश्चापरे-राजसाः, तामसाश्च॥4॥
Ca.Ni. 1/4

3 types – *Agneya, Soumya* and *Vayavya*[8]. *Agneya Vikaras* are manifested due to the *Pitta Prakopa*. *Soumya Vikaras* are *Kaphaja Vikaras* and *Vayavya Vikaras* will occur due to the vitiation of *Vata Dosha*.

3 types – *Nija, Agantu* and *Manasa*[9].

- ⇨ *Nija Vikaras* will be manifested due to the imbalance of *Saririka Doshas*.
- ⇨ *Agantu Vikaras* occur because of the exposure to toxins, toxic air, burn injuries or trauma.
- ⇨ *Manasa Vikaras* will occur because of the attainment of undesired things or non attainment of desired things or things where person has maximum passion.

त्रिविधाश्च पुनर्व्याधयो मृदुमध्याऽधिमात्रभेदेन।
तत्राल्पलक्षणा मृदवो मध्यलक्षणा मध्याः
सम्पूर्णलक्षणास्त्वधिमात्राः। A.S.Su. – 22/4

3 types – *Mridu, Madhya* and *Atimatra*[10]. *Mridu Vyadhis* have *Alpa Lakshana*. *Madhya Vikaras* have *Madhya Lakshana* whereas the *Atimatra Vyadhis* have *Sampurna Lakshana* (full blown symptoms).

तच्च दुःख त्रिविधं-आध्यात्मिकं, आधिभौतिकं,
आधिदैविकमिति। Su.Su. 24/4

3 types – *Adhyatmika, Adhibhoutika* and *Adhidaivika*. The description of these classification will be dealt later in detail.

- ⇨ The diseases affecting one individual by his misdeeds is coming under the heading of *Adhyatmika Vikara*.
- ⇨ The diseases manifested due to external factors such as weapons, wild animals, other people are coming under the heading of *Adhibhoutika Vikara*.
- ⇨ The diseases which will manifest due to supra human power where the person or other animals or people are having no role in the manifestation of the diseases is coming under the heading of *Adhidaivika Vikara*.

व्याधिविशेषास्तु प्रागभिहिताः; सर्व एतैते त्रिविधाः-
साध्या, याप्याः, प्रत्याख्येयाश्च।
तत्र एतान् भूयस्त्रिधा परीक्षेत-किमसौ औपसर्गिको
यः पूर्वोत्पन्नं व्याधिं जघन्यकालजातो व्याधिरुपसृजति
स तन्मूल एवोपद्रवसंज्ञः, प्राक्केवलो यः प्रागेवोत्पन्नो
व्याधिरपूर्वरूपोऽनुपद्रवश्च; अन्यलक्षणो यो भविष्यद्व्याधि-
ख्यापकः स पूर्वरूपसंज्ञः।

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[8] In case of *Agneya Vikara*, *Pitta* line of treatment should be planned, in case of *Saumya Vikara*, *Kapha* line of treatment should be adopted and in case of *Vayavya Vikara*, *Vata* line of treatment should be implemented.

[9] Line of treatment for *Nija* and *Agantuja Vikara* are explained earlier in the present chapter and in case of *Manasika Vikara*, psychotherapy should be planned such as gestalt therapy, transactional analysis, neuro linguistic programming, logotherapy, hypnotherapy etc.

[10] *Charaka* states in case of *Alpa Dosha* vitiation, *Langhana* line of treatment, in case of *Madhyama Dosha* vitiation, *Langhana Pachana* line of treatment and in case of *Bahudosha* vitiation, *Doshavasechana* line of treatment is adopted. Cha. Vi. 3/42-44

तत्र, सोप-
द्रवमन्योन्याविरोधेनोपक्रमेत, बलवन्तमुपंद्रवं वा;
प्राक्केवलं यथास्वं प्रतिकुर्वीत; अन्यलक्षणे तु आदिव्याधयौ
प्रयतेत॥18॥ Su.Su. 35/18

3 types – *Sadhya, Yapya* and *Pratyakhyeya*[11].

3 types – *Oupasargika, Prakkevala* and *Anyalakshana*[12].

- ⇨ *Oupasargika Vikaras* are those which will be manifested after the manifestation of main disease, also known as *Upadrava*.
- ⇨ *Prakkevala Vikaras* is the stage in which the clinician can see neither *Purvarupa* nor *Upadrava*.
- ⇨ *Anyalakshana Vikaras* are those which will give us the knowledge of the forthcoming disease.

4 types – *Sukhasadhya, Kricchrasadhya, Yapya* and *Pratyakhyeya*. The details of these terminologies will be discussed in the context of *Sadhyasadhyata*[13] of the diseases. Several factors such as number of *Dosha* involved, whether *Sharirika* or *Manasika*, number of *Dushya* involved, number of *Srotas* involved, duration of the disease, nature of involvement of *Rogamarga*, presence of *Upadrava* whether mild or severe etc should be noted.

4 types – *Agantu, Vata, Pitta* and *Kaphanimitta Vikaras*.

चत्वारो रोगा भवन्ति-आगन्तुवातपित्तश्लेष्म-निमित्ताः;
Ca.Su. – 20/3

4 types – *Agantuja, Sarira, Manasa* and *Svabhavika Vikaras*.

ते चतुर्विधाः-आगन्तवः, शरीरा;, मानसा;,
स्वाभाविकाश्चेति॥23॥ Su.Su. – 1/23
तेष्वागन्तवोऽभिघातनिमित्ताः (॥1॥) Su.Su. – 1/24-1

Agantuja Vikaras[14] occur due to the trauma (*Abhighata*).

शारीरास्त्वन्नपानमूला वातपित्तकफशोणितसन्नि-
पातवैषम्यनिमित्ताः (॥2॥) Su.Su. – 1/24-2

Sarira Vikaras[15] will be manifested due to the abnormal diet (*Annapana*) because of the imbalance of the *Vata, Pitta, Kapha, Rakta* or *Sannipata Prakopa*.

मानसास्तु क्रोधशोकभयहर्षविषादेर्ष्याभ्यसूयादैन्य-
मात्सर्यकामलोभप्रभृतय इच्छाद्वेषभेदैर्भवन्ति॥3॥
Su.Su. – 1/24-3

Manasa Vikaras[16] will be seen in patients because of *Krodha* (anger), *Soka* (grief), *Bhaya* (fear), *Harsha* (happiness), *Vishada* (sorrow), *Irshya* (jealousy), *Abhyasuya, Dainya, Matsarya, Kama* (desire), *Lobha* etc and because of excess passion or aversion towards anything or anybody.

स्वाभाविकास्तु क्षुत्पिपासाजरामृत्युनिद्राप्रकृतयः॥4॥
Su.Su. – 1/24-4

Svabhavika Vikaras[17] will be observed in each

GK

[11] This set of classification will be helpful in predicting prognosis of the disease in the patient.

[12] This set of classification will be helpful in predicting the presenting symptom or disease in prodromal stage or complication stage or whether it is cardinal feature or not. Thus, we can give prime importance for presenting complaint depending upon the severity of the symptom, duration of the clinical presentation etc.

[13] *Sadhyasadhyata* of the illness will be helpful in analysing
1. Probable consequence of the presenting complaint
2. Progression of the presenting complaint if proper treatment is not being given
3. How many days are necessary for the relief of the presenting complaint
4. In planning the appropriate line of treatment

[14] First, symptomatic treatment should be planned in case of *Agantuja Vikara* for first 7 days. After 7 days, one should plan the treatment based on the vitiation of *Dosha*

[15] As *Sharirika Vikaras* are manifested due to the vitiation of *Dosha* and in case of surgical diseases, *Rakta* will be afflicted, we have to plan the management for the restoration of the vitiated *Dosha* and *Rakta*.

[16] First of all, if we are not giving any treatment to abnormal mental functioning, we will not get any improvement in the status of the patient. That is why, one should plan *Satvavajaya Chikitsa*.

[17] The diseases mentioned in this context, they can occur as *Kalaja* (timely manifestation) and *Akalaja* (un-

and every individual such as *Kshudha* (hunger), *Pipasa* (thirst), *Jara* (aging), *Mrityu* (death) and *Nidra* (sleep).

7 types – *Adibala Pravritta, Janmabala Pravritta, Doshabala Pravritta, Sanghatabala Pravritta, Kalabala Pravritta, Daivabala Pravritta, Svabhavabala Pravritta.* Here the word *Bala* refers to dominance or strong etiological factor and *Pravritta* refers to the manifested and the word *Vikara* is added as suffix to *Pravritta* which refers to disease. In essence, the term *Adibala Pravritta Vikara* refers to the manifestation of disease where in the cause of the disease is present prior to the formation of *Garbha* (foetus), i.e. *Shukra* (sperm) and *Artava* (ovum).

तत्रादिबलप्रवृत्ता ये शुक्रशोणितदोषान्वयाः कुष्ठार्शः प्रभृतयः; तेऽपि द्विविधाः मातृजाः, पितृजाश्च।
जन्मबलप्रवृत्ता ये मातुरपचारात् पङ्गुजात्यन्धबधिरमूकमिणिमणवामनप्रभृतयो जायन्ते; तेऽपि द्विविधाः रसकृताः, दौहृदापचारकृताश्च।
दोषबलप्रवृत्ता ये आतङ्कसमुत्पन्ना मिथ्याहाराचारभवाश्च; तेऽपि द्विविधाः आमाशयमुत्थाः, पक्वाशयसमुत्थाश्च।
पुनश्च द्विविधाः-शारीरा, मानसाश्च।
त एते आध्यात्मिकाः॥5॥ Su.Su. – 24/5

Adibala Pravritta Vikaras – As stated earlier, the term *Adibala Pravritta Vikara* are those diseases which are manifested due to the aetiological factors prior to the formation of *Garbha*. That means the aetiological factors are abnormal *Shukra* and *Shonita* of parents. These diseases are of two types – *Matruja* and *Pitruja*. The examples given by *Susruta* for this type of *Vikaras* are *Kushtha* (any skin disease), *Arsas* (disease of anus), *Prameha* (disease presented with passage of excess and turbid urine) etc. These types of diseases are coming under the umbrella of genetic diseases.

Janmabala Pravritta Vikaras – In *Janmabala Pravritta Vikara*, there will be formation of proper *Garbha*. But the aetiological factor lies in the maldevelopment of *Garbha*. This type of *Vikaras* manifest due to the abnormal diet and regimen of pregnant woman. These are of two types, namely *Rasakrita* and *Douhrita Apacharakrita*. *Rasakrita* refers to the diseases manifested due to abnormal diet whereas the *Douhrita Apacharakrita* refers to the diseases occur because of the abnormal likings. In the modern parlance, this is termed as pica of pregnancy. The examples mentioned under this category are *Pangu* (disease where in loss of strength in both lower limbs are observed), *Jatyandha* (blind by birth), *Badhira* (deafness), *Muka* (dumbness), *Minmina* (nasal intonation of voice) and *Vamana* (dwarfism) etc. Congenital anomalies are considered under this category.

Doshabala Pravritta Vikaras – In this category of the diseases, the aetiological factor is considered to be responsible for the manifestation of the disease after birth. In this type, the exposure to the aetiological factor is after birth. This type of *Vikaras* manifest due to the improper diet and regimen. There are two classifications mentioned under this category. The first one is *Amasayasamuttha* and *Pakvasayasamuttha*. The second classification is *Sarira* and *Manasa Vikaras*. The former classification is helpful in planning the *Samshodhana* and *Samsamana* therapy i.e. *Amasaya* is the *Udbhava Sthana* for *Kapha Pittaja Vikaras* and *Pakvasaya* is the *Udbhava Sthana* for the *Vataja Vikaras*. *Asannamargaharana* is the best and widely accepted line of management in textbooks of *Ayurveda*. The latter classification is helpful in planning the treatment again but with different angle. *Yukti Vyapasraya Chikitsa* and *Satvavajaya Chikitsa* are being used in the management of *Sarira* and *Manasa Vikaras*. The usage of *Yukti Vyapasraya* and *Satvavajaya Chikitsa* is left to the intellect of the clinician.

Sanghatabala Pravritta Vikaras –

संघातबलप्रवृत्ता य आगन्तवो दुर्बलस्य बलवद्विग्रहात्; तेऽपि द्विविधाः-शस्त्रकृता, व्यालादिकृताश्च।
एते आधिभौतिकाः॥6॥ Su.Su. – 24/6

In this category of the diseases, the aetiological factor is not the abnormal diet and regimen of the self, rather it is present in some other materialistic causes either living or non living things. This type of *Vikaras* manifest due to the external causes or due to the excess strain taken by the weak people. These are of two types. *Sastrakrita* (either surgical instruments or weapons) and *Vyalakrita* (wild animals). *Sastrakrita Vikaras* are manifested due to the trauma to the individuals by different weapons used in warfare or surgery. *Vyalakrita Vikaras* are manifested due to the injury by the wild animals such as tiger etc.

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timely manifestation). In such conditions, we should give more stress on mitigating untimely manifestation of the diseases.

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कालबलप्रवृत्ता ये शीतोष्णवातवर्षाप्रभृतिनिमित्तास्तेऽपि द्विविधा व्यापन्नर्तुकृता अव्यापन्नर्तुकृताश्च।
दैवबलप्रवृत्ता ये देवद्रोहादभिशस्तकाअथर्वकृता उपसर्गकृताश्च; तेऽपि द्विविधा विद्युदशनिकृताः, पिशाचादिकृताश्च; पुनश्च द्विविधाः संसर्गजा, आकस्मिकाश्च।
स्वभावबलप्रवृत्ताः क्षुत्पिपासाजरामृत्युनिद्राप्रभृतयः; तेऽपि द्विविधाः कालकृता, अकालकृताश्च; तत्र परिरक्षणकृताः कालकृता, अपरिरक्षणकृता अकालकृताः।
एते आदिदैविकाः।
अत्र सर्वव्याध्यवरोधः॥7॥ Su.Su. – 24/7

Kalabala Pravritta Vikaras – in this set of the diseases, the main cause for the manifestation of the diseases lies in abnormal season or time. This type of *Vikaras* manifest due to seasonal variations such as abnormal heat, cold or rain or sunrays etc. These are of two types. *Vyapannartukrita* and *Avyapannartukrita*. *Vyapannartu krita Vikaras* manifest due to the abnormal *Ritu*. *Avyapannartu krita Vikaras* manifest due to abnormal diet and regimen. Such type of *Vikaras* cannot be attributed to the seasonal variations.

Daivabala Pravritta Vikaras – in this category of the diseases, the aetiological factor is considered to be curse of supra human power which is beyond one's control for the manifestation of the diseases. It manifests due to the curse of heavenly figures or Gods or cows or teachers. *Atharvanakrita* (diseases manifested due to chanting of *Mantra* mentioned in *Atharvaveda*) and *Upasargaja* (manifestation of diseases due to the contact of healthy people with people having ill health) are the examples of this set of diseases. They are of two types – *Vidyut Ashanikrita* (diseases manifested in the individuals who are exposed to either lightening or thunderbolt) and *Pishachadikrita* (diseases manifested due to the exposure to *Pishacha* etc). They are further classified into two types – *Samsargaja* (diseases manifested in the individuals who are having the contact with people with antisocial activity) and *Akasmika* (manifestation of the diseases in the individuals who are not exposed to any of the aetiological factors and the cause is considered to be ill deeds done in one's past life).

Svabhavabala Pravritta Vikara – in this category of the diseases, the aetiological factor is considered to be natural. That means these set of diseases can occur in each and every individual and that too at regular time intervals. Nature is considered to be the main reason for the manifestation of this set of the diseases. These are of two types – *Kalakrita* (the diseases manifested in an individual at proper time) and *Akalakrita* (the diseases manifested in an individual at improper time). The examples of this set of the diseases are *Kshut* (hunger), *Pipasa* (sleep), *Jara* (aging), *Mrityu* (death) and *Nidra* (sleep) etc. When the person develops hunger at 8 AM can be considered to be *Kalaja* and when the same individual gets hunger at 10 AM then such type of hunger (*Kshudha*) is considered as *Akalaja*. When the person dies at the age of 10 years, then such type of *Mrityu* is *Akalaja* and when the person dies at the age of 85 years or more, then such type of death is considered as *Kalaja*.

7 types as per *Vagbhata* based on *Dosha Pradhanya*[18]: These are classified based on the dominance of the single *Dosha* or two *Doshas*

GK [18] For this type of analysis, one should list out all symptoms expressed by the patient and should be written in chronological order and analyse each of these symptoms in terms of vitiation of *Dosha*, *Dhatu* and *Mala*, so that the dominance of the *Dosha* in each of the disease can be analysed and appropriate treatment can be planned.

or all *Doshas*. This type of classification is helpful in the proper assessment of the patient i.e. his present status, his previous history to evaluate the assessment of *Nidana*, to predict the *Sadhyasadhyata* and probable line of management.

7 types of diseases as per *Vagbhata*: These are *Sahaja, Garbhaja, Jataja, Pidaja, Kalaja, Prabhavaja* and *Svabhavaja Vikaras.*

सप्तविधाः खलु रोगा भवन्ति।
सहगर्भजातपीडा-कालप्रभावस्वभावजाः।
ते तु पृथग्द्विविधाः।
तज सहजाः शुक्रार्तवदोषान्वयाः।
कुष्ठार्शोमेहादयः।
पितृजा मातृजाश्च।
गर्भजा जनन्यभिचारात् कौब्जपाङ्गुल्यपैङ्गल्य-
किलासादयोऽन्नरसजा दौहृदविमाननजाश्च।
जातजाः स्वापचारात् सन्तर्पणजा अपतर्पणजाश्च।
जातजाःस्वापचारात् सन्तर्पणजाअपतर्पणजाश्च।
पीडाकृताः क्षतभङ्गप्रहारक्रोधशोकभयादयः
शारीरमानसाश्च।
कालजाः शीतादिकृता ज्वरादयो व्यापन्नजा
असंरक्षणजाश्च।
प्रभावजा देवगुरूल्लङ्घनशापाथर्वणादिकृता ज्वरादयः
पिशाचादयश्च।
स्वभावजाः क्षुत्पिपासाज्वरादयः कालजा अकालजाश्च।
तत्र कालजा रक्षणकृताः।
अरक्षणजा अकालजाः।
त एते समासतः पुनर्द्विविधा भवन्ति। A.Hr.Su. – 22/3

Sahaja Vikara: This category of diseases actually manifest because of the union of abnormal *Sukra* and/ or *Sonita*. These diseases will be persisting along with the individuals (*Pumsa saha jatatvat sahajah*). These are of two types, namely Sukraja (defective sperm) and *Artavaja Doshajanya* (defective ovum). *Kustha* (any skin disease), *Arsas* (haemorrhoids) and *Meha* (spectrum of disease where excess and turbid micturition is observed) are considered under the category of *Sahaja Vikaras*. *Raktapitta* is considered to be *Asukari* or *Kshiprakari*, that is why it is not mentioned under *Sahaja Vikara*.

Garbhaja Vikara: This category of diseases is manifested because of the improper development of *Garbha*. These type of diseases are manifested either because of improper diet and regimen by pregnant women (not following proper *Garbhini Paricharya* or intake of *Garbhopaghatakara Bhavas*). These are of two types – *Annarasaja* (abnormal diet and dietetic pattern) and *Douhrida Avimanaja* (abnormal diet and regimen followed by pregnant ladies after crossing 4th month of pregnancy). The disorders mentioned in this category are *Koubjya* (short stature), *Pangulya* (inability to walk as defect in both lower limbs are seen), *Paingalya* (colour of the skin resembles the colour of monkey), *Kilasa* (abnormal whitish discolouration) etc.

Jataja Vikara: This category of diseases manifested due to abnormal diet and regimen of individuals. This is different from *Sahaja Vikara*, as *Sahaja Vikaras* are manifested due to the abnormal *Sukra* or *Sonita*. But *Jataja Vikaras* are manifested due to the abnormal diet and regimen of oneself who gets the disease. These are of two types – *Santarpanaja* (overnourishment) and *Apatarpanaja* (under nourishment). *Prameha* (a spectrum of diseases where excess and turbid urine is passed), *Amapradosha* (acute condition of *Annavaha Srotas* where stasis of the food in *Amashaya* or excess movement of vitiated *Dosha* through oral and anal route in the form of vomiting and diarrhoea is observed), *Medoroga* (obesity) are some examples of *Santarpanaja Vikaras*. *Vatavyadhi* (spectrum of diseases caused by abnormally increased *Vata Dosha* in the body), *Ojakshaya* (decrease of essence of all seven *Dhatus*) are some examples of *Apatarpanaja Vikaras*.

Pidajanya Vikara: This set of diseases manifested due to physical injury or mental stress. These manifested due to the *Agantuja Karanas* without any vitiation of *Dosha*. They are of two varieties, namely *Sarira* (physical) and *Manasa* (mental) *Vikaras*. The examples given for *Sarira Vikaras* are *Kshata* (trauma), *Bhanga* (fracture), *Prahara* (trauma due to weapons). The examples given for *Manasa Vikaras* are *Krodha* (anger), *Soka* (grief) and *Bhaya* (fear).

Kalaja Vikara: This category of diseases are manifested due to the variations in the seasons. The causes mentioned for this type of diseases are abnormal seasonal changes such as excess cold or heat or rain etc. The types mentioned under this category are *Vyapannaja* and *Asamrakshanaja*. The word *Vyapannaja* refers to the set of diseases which manifest due to the consumption of rice which are affected by the excess cold, heat or rain. The term *Asamrakshanaja* refers to set of diseases which manifest because of exposure to cold etc.

Prabhavaja Vikara: This set of diseases are manifested due to the curse of God, teachers; not obeying the commands of God, teachers or elders; or due to the performance of Tantra (measures) mentioned in *Atharvaveda*. These are of two types – *Jwaradi* (*Jvara* etc) and *Pishachadi* (microorganisms etc).

Svabhavaja Vikara: These disorders are present in each and every person and the occurrence of these different symptoms are considered as normal. For example, *Kshut* (hunger), Pipasa (thirst), *Jvara* (fever).

These are of two types –

(a) *Kalaja* (timely manifesting diseases) and

(b) *Akalaja* (untimely manifesting diseases).

When the person gets hunger at 8 AM, then it can be considered as *Kalaja* and when the same person gets hunger at 9.30 AM or so, then such type of discomfort is considered as *Akalaja*. *Ashtanga Sangraha* specified *Jvara* (raised body temperature) instead of *Jara* (aging) in *Svabhavaja Vikara*. The reason as per *Vagbhata* is *Jvara* usually manifested in the individuals who has approached the end of life.

As per western medicine, several classifications are being made. The most popular classification of the diseases is system wise classification. Depending upon the presenting complaints and signs observed, the diagnosis of the systemic disease will be made. Let us learn this concept with one or two examples.

Dysphagia, anorexia, regurgitation, sour eructations, burning sensation in the epigastrium, haemetemesis, nausea, vomiting, pain abdomen, swelling in the epigastric region, loss of appetite, diarrhoea, constipation, bleeding per rectum, black tarry stools are the group of symptoms seen in alimentary canal dysfunction. Further, when the person is presented with dysphagia, we are going to analyse the site of dysfunction will be at either mouth, pharynx or oesophagus. Further, if the person is presented with difficulty in voluntary phase of swallowing, we can infer the site of the lesion is at either mouth or pharynx. This is how we are going to analyse the systemic dysfunction.

Let us take another example. Increasing frequency of micturition, dysuria, pain in the abdomen radiating from loin to groin, pain in the suprapubic or hypogastric region, burning micturition, hesitancy (difficulty in initiating the act of micturition), intermittency (lack of continuous flow of micturition), hematuria are suggestive of dysfunction of urinary system. Presence of increased frequency of micturition makes us to infer the involvement of kidney, renal pelvis of ureter. Diagnosis of ureteric involvement can be predicted when the person is presented with pain the abdominal region radiating from loin to groin. Pain in the suprapubic region usually helps us to infer the site of origin of discomfort is urinary bladder. We can make the diagnosis of urethral involvement when the person is presented with burning micturition. Diagnosis of prostate involvement can be predicted when the person is presented with complaints of hesitancy and intermittency. Thus, we can categorise the systemic dysfunction based on clinical presentation.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha and Ashtanga Hridaya excerpts
2. Savill's system of clinical medicine revised and edited by E C Warner, 14th Edition, CBS Publishers and Distributors, Delhi, 1997
3. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie and Christopher C Evans, 12th Edition, Butterwoth Heinemann Publications, New Delhi, 1997
4. Physical diagnosis – a textbook of symptoms and physical signs by Rustom Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
5. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005

Key points of the chapter

- ⇨ विविधं दुःखमादधातीति व्याधिः।। चक्र, च.नि. - 1/5 Vyadhi or disease is the one which gives various kinds of discomforts to the body. It could be Kayika (physical) or Manasika (psychological) or Vachika (speech related). As per some other authors, imbalance in the Doshik entities is termed as Vyadhi. As per some other opinion, Vyadhi is manifested due to the amalgamation of Dosha and Dushya in the body.
- ⇨ Vyadhi, Amaya, Gada, Atanka, Yakshma, Jvara, Vikara, Roga, Papma, Abadha are the different synonyms of Vyadhi available in Ayurveda literatures.
- ⇨ If we search Ayurveda literatures, several ways of classification of diseases are mentioned. Each of the classification are made on the basis of sound rationale which was discussed in the present chapter.
- ⇨ Few of the important classification of diseases are mentioned below:
  - ☐ **2 types of diseases** – Samanyaja and Nanatmaja Vikara
  - ☐ **2 types of diseases** – Amashayasamuttha and Pakvashayasamuttha
  - ☐ **2 types of diseases** – Prakrita and Vaikrita
  - ☐ **3 types of diseases** – Adhyatmika, Adhibhoutika and Adhidaivika
  - ☐ **4 types of diseases** – Sukhasadhya, Krichrasadhya, Yapya, Pratyakhyeya
  - ☐ **7 types of diseases** – Adibala Pravritta, Janmabala Pravritta, Doshabala Pravritta, Sanghatabala Pravritta, Kalabala Pravritta, Daivabala Pravritta, Svabhavabala Pravritta

Probable questions may be asked in the examination

Long essays

- ⇨ Explain the different classification of Vyadhi as per different textbooks of Ayurveda
- ⇨ Define Vyadhi, give the synonyms of Vyadhi. Classify Vyadhi. Define Ojas. What do you mean by Vyadhikshamatva?
- ⇨ Write the various Vargikarana (classification) of Roga
- ⇨ Explain Vataja Nanatmaja Vikara
- ⇨ Explain Pittaja Nanatmaja Vikara
- ⇨ Explain Kaphaja Nanatmaja Vikara
- ⇨ Explain the 7 types of classification of Vikara as per Sushruta

- ⇨ Define Vyadhi and write various classification of Vikara
- ⇨ Define Vyadhi, write synonyms of Vyadhi and explain Sushrutokta Vyadhi Vargikarana
- ⇨ Write various definitions of Vyadhi and describe detail classification of Vyadhi

Short essays

- ⇨ Asadhya Vyadhi Lakshana
- ⇨ Write definitions of Vyadhi
- ⇨ Explain Aupasargika Roga
- ⇨ Nanatmaja Vyadhi
- ⇨ Define Vyadhi and explain its Paryayas
- ⇨ Describe definitions and synonyms of Vyadhi
- ⇨ Write various definitions of Vyadhi
- ⇨ Describe Adhyatmika Vikara
- ⇨ Describe Adbhidaivika Vikara
- ⇨ Write about Sanghatabala Pravritta Vikara
- ⇨ Pittaja Nanatmaja Vikara
- ⇨ Vyadhi

Short answers

- ⇨ Vyadhi Ghataka
- ⇨ Vyadhi Paryaya or synonyms
- ⇨ Definition of Vyadhi
- ⇨ Samsargaja Vikara
- ⇨ Nanatmaja Vikara
- ⇨ Janmabala Pravritta Vikara
- ⇨ Yapya Roga
- ⇨ Aupasargika Roga
- ⇨ Adhibhautika Vikara (Roga)
- ⇨ Adibala Pravritta Vyadhi
- ⇨ Kalabala Pravritta Vyadhi
- ⇨ Sadhya Asadhya Vichara
- ⇨ Trividha Dukha
- ⇨ Sadhya Roga Lakshana
- ⇨ Define Nanatmaja Vyadhi
- ⇨ Sanghatabala Pravritta Vikara
- ⇨ Daruna Vikara
- ⇨ Prakkevala Vikara
- ⇨ Pratyakhyeya Vyadhi Lakshana
- ⇨ Amaya
- ⇨ Svabhavabala Pravritta Vikara

MCQs

1. **Abadha is the synonym of**
   a. Nidana;
   b. Vyadhi;
   c. Samprapti;
   d. Upashaya
   Answer -(b)
2. **As per Charaka, the total number of Samanyaja Vikara is**
   a. 24;
   b. 48;
   c. 96;
   d. Innumerable
   Answer -(b)
3. **The number of Pittaja Nanatmaja Vikara is**
   a. 40;
   b. 20;
   c. 80;
   d. 10
   Answer -(a)
4. **The total number of Vikara as per Sushruta is**
   a. 140;
   b. 1120;
   c. 48;
   d. Innumerable
   Answer -(b)
5. **Amashaya becomes the Udbhava Sthana for ....dominant diseases.**
   a. Kapha;
   b. Pitta;
   c. Both 1 and 2;

d. Vata

Answer -(c)

6. **22 years old male patient presented with cough with large amount of whitish coloured sputum. This is an example of**

a. Prakrita Vikara;

b. Vaikrita Vikara;

c. Both 1 and 2;

d. None of the above

Answer -(a)

7. **Prameha is included in -------------type of Vikara.**

a. Adhyatmika;

b. Adhibhoutika;

c. Adhidaivika;

d. None of the above

Answer -(a)

8. **Prameha is included in ------------ type of Vikara.**

a. Janmabala Pravritta;

b. Doshabala Pravritta;

c. Sanghatabala Pravritta;

d. Adibala Pravritta

Answer -(d)

9. **Find the one which does not belong to one group**

a. Kushtha;

b. Prameha;

c. Arshas;

d. Minmina

Answer -(d)

10. **Find the one which does not belong to one group**

a. Kalabala Pravritta Vikara;

b. Sanghatabala Pravritta Vikara;

c. Svabhavabala Pravritta Vikara;

d. Daivabala Pravritta Vikara

Answer -(b)

11. **Death is considered as**

a. Kalabala Pravritta Vikara;

b. Daivabala Pravritta Vikara;

c. Svabhavabala Pravritta Vikara;

d. Adibala Pravritta Vikara

Answer -(c)

12. **Sports injury is considered as**

a. Sanghatabala Pravritta Vikara;

b. Adibala Pravritta Vikara;

c. Janmabala Pravritta Vikara;

d. Doshabala Pravritta Vikara

13. **Scorpion bite is categorized under**

a. Adhyatmika Vikara;

b. Adhibhoutika Vikara;

c. Adhidaivika Vikara;

d. All of the above

Answer -(b)

14. **Amashayasamuttha and Pakvashayasamuttha Vikara are categorized under**

a. Adibala Pravritta Vikara;

b. Janmabala Pravritta Vikara;

c. Doshabala Pravritta Vikara;

d. Sanghatabala Pravritta Vikara

Answer -(c)

15. **Sahaja Vikara of Ashtanga Sangraha can be compared to ....type of Vikara as per Sushruta.**

a. Adibala Pravritta Vikara;

b. Janmabala Pravritta Vikara;

c. Doshabala Pravritta Vikara;

d. Svabhavabala Pravritta Vikara

Answer -(a)

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Vyadhi Namakarana Siddhanta

2

Learning objectives

- To learn the various aspects regarding naming of the diseases in Ayurveda

  Naming of the diseases are based on different criteria. These criteria are

  - Based on Prakriti (nearest cause of the disease such as Vata)
  - Based on the type of discomfort
  - Based on the nature of discolouration
  - Based on the type of Nidana
  - Based on the location of the disease
  - Based on the cardinal clinical feature
  - Based on the simile
  - Based on conglomeration of Dosha and Dushya
  - Based on disturbance of physical activity
  - Based on Dhatu afflicted
  - Based on structural damage
  - Based on incidence

The term *Vyadhi Namakarana Siddhanta* is the set of principles which is followed to name a disease. Several criteria are used to name the disease which are named below:

Based on *Prakriti* (nearest cause of the disease such as *Vata* etc *Dosha*): for example, in case of *Vatarakta*, there will be involvement of *Vata* and *Rakta*; in case of *Amla pitta*, there will be dominance of *Vidagdha Pitta* during the course of the illness; *Vatavyadhi* is termed due to the involvement of morbid *Vata Dosha* in the manifestation of the disease.

Based on the type of discomfort[1]: For example, the presence of pricking type of pain in *Sula*[2]; the absence of rememberance (*Smarana*) in *Apasmara*;[3] frequent *Dravamala Pravritti* (liquid consistency of stool) in *Atisara*; the contents which come out through mouth and which causes discomfort in all over the body is termed as *Chardi*; the sound produced which is similar to the sound of broken bronze vessel is called as *Kasa*; the sound which is similar to the sound like *Hik* is termed as *Hikka*; the stasis of contents of food in *Amashaya* which neither move upwards or downwards is termed as *Alasaka*; the passage of urine with great difficulty is termed as *Mutrakricchra*.

Based on the nature of discolouration: for example, the *Ketaki Dhuli Varna* (yellowish white) in *Pandu*;[4] *Bhekavarna* (yellowish discolouration) in *Kamala*; colour of urine resembles *Haridra* observed in the patient

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GK

[1] गुदेन बहुद्रवसरणमतिसार
छादयन्नाननं वेगैरर्दयन्नङ्गभञ्जनैः। निरुच्यते छर्दिरिति
कसनात् कास उच्यते
हिगिति कृत्वा कायति शब्दायते इति हिक्का
आमाशयेऽलसीभूतस्तेन सोऽलसकः स्मृतः
मूत्रस्य क्च्छ्रेण महता च दुःखेन प्रवृतिः मूत्रकृच्छ्रम्

[2] शङ्कुस्फोटनवत् तस्य यस्मात्तीव्रा हि वेदना।।

[3] स्मृतेरपध्वंसमपस्मारं

[4] पाण्डुना वक्ष्यमाणहरितादिवर्णेभ्यः प्रधानेन वर्णेनोपलक्षितो रोगः पाण्डुरोगः।।

suffering from *Haridra Meha*;

Based on the type of *Nidana* or etiology: the frequent consumption of *Kalaya* in the patient of *Kalayakhanja*; chest discomfort caused by *Hridroga* due to affliction of *Krimi* is termed as *Krimija Hridroga*; *Rajayakshma* manifested due to the exposure to *Sahasa*[5] is termed as *Sahasajanya Rajayakshma*; *Pandu* manifested due to consumption of mud is termed as *Mrid Bhakshanajanya Pandu*; *Trishna*[6] manifested due to the consumption of *Madya* is termed as *Madyaja Trishna*; *Panatyaya*[7] is termed due to the excess intake of *Madya*; *Acharana* is termed due to improper cleaning of the private parts by the woman.

Based on location of disease– the disease *Grahani* is named because of the involvement of *Grahani* which is leading to digestive impairment; the diagnosis of *Hanugraha* is named because of stiffness of *Hanusandhi*; *Shira Shula* is named due to the pricking type of pain observed in *Shiras* (head); *Hridroga* is termed due to the discomfort in the *Hridaya* region; *Urustambha* is termed due to the involvement of *Uru* (thigh); *Manyastambha* is termed due to the involvement of *Manya* (back of the neck) region; *Yonivyapat* is termed, as there will be affliction of *Yoni* (female genitals).

Based on the cardinal clinical feature – pricking type of pain felt all over the body is seen in the patients of *Visuchika*, that is why patients presented with pricking type of pain all over the body is termed as *Visuchika*[8]. *Shula* is termed due to the pricking type of pain similar to the pricking nature as if cone is pricking the skin; *Jvara*[9] is termed due to the cardinal feature of burning sensation of all over the body and abnormal function of *Manas*;

Based on the simile – *Manjishthameha* is termed due to the discolouration of urine resembles the colour of *Manjishtha*; *Kroshthuka Shirsha*[10] is termed as the swelling due to the affected knee joint of the limb resembles the head of the fox; *Gridhrasi* is termed as the gait of the vulture is observed in the patients of *Gridhrasi*[11];

Based on conglomeration of *Dosha* and *Dushya*: *Vatarakta* is termed due to the admixture of morbid *Vata* and abnormal *Rakta* in the body; *raktapitta* is termed due to the admixture of morbid *Pitta* and abnormal *Rakta*; *Amavata* is termed due to the admixture of morbid *Vata* and poorly formed *Ama*.

Based on disturbance of physical activity- *Nidranasha* is termed due to the abnormal sleep pattern in the suffering individuals

Based on *Dhatu* afflicted: *Shukradushti* is termed due to the involvement of *Shukra* in the individuals

Based on structural damage: *Sandhimoksha* is termed due to the separation/ dislocation of *Sandhi* and *Gudabhramsha* is termed due to the descent of rectum through *Guda* (anus).

Based on incidence: *Adhyavata*[12] is termed due to the presence of clinical condition in people hailing from upper middle class or upper class in the patients suffering from *Vatarakta* and *Medasavrita Vata*.

Reference

त एवापरिसंख्येया भिद्यमाना भवन्ति हि।
रुजावर्णसमुत्थानस्थानसंस्थाननामभिः॥42॥
व्यवस्थाकरणं तेषां यथास्थूलेषु संग्रहः।
तथा प्रकृतिसामान्यं विकारेषूपदिश्यते॥43॥

Ca.Su. – 18/42-43

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[5] साहसादिति बलवद्विग्रहादिरुरःक्षतहेतुत्वेन कारणम्॥

[6] *Cardial* feature *Trishna* (thirst) manifests in an individual due to excess consumption of *Madya* (intoxicating substances)

[7] Disturbance of *Manas* occurs due to the impact of excess consumption of *Madya* and impairment of *Manas* function is *Panatyaya*.

[8] सूचीभिरिव गात्राणि भिनत्तीति विसूचिका॥

[9] ज्वर प्रत्यात्मिकं लिङ्गं सन्तापो देहमानसः॥

[10] क्रोष्टुकशीर्षवत् इति शृगालमस्तकवत् स्थूलः॥

[11] गृध्रवत् चलतीति गृध्रसी॥

[12] As the disease more commonly observed in the patients who are having sedentary life style.

Reference

विकाराः पुनरपरिसंख्येयाः, प्रकृत्यधिष्ठानलिङ्गायतनविकल्पविशेषापरिसंख्येयत्वात्॥3॥ Ca.Su. – 20/3

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha and Ashtanga Hridaya excerpts and related Ayurvedic literatures

Key points of the chapter

- त एवापरिसंख्येया भिद्यमाना भवन्ति हि। रुजावर्णसमुत्थानस्थानसंस्थाननामभिः॥ Ca.Su. – 18/42 Naming of the disease is based on nature of discomfort, discolouration, causative factors, site of the clinical manifestation, clinical features etc.
- Visuchika is named because of the cardinal feature of pricking type of pain all over the body. This type of clinical presentation is observed when the person is having excess fluid loss from the body and this type of excess fluid loss is seen more fluid loss from both oral and anal route.

Probable questions may be asked in the examination

Long essays and short answers: the questions from this category are less likely to be asked

Short essays

- Vyadhi Namakarana
- Explain Vyadhi Namakarana Siddhanta
- Write the criteria for nomenclature of diseases in Ayurveda

MCQs

1. **Kroshthuka Shirsha is named based on**
   - a. Simile;
   - b. Nidana;
   - c. Prakriti;
   - d. Type of discomfort

   Answer -(a)
2. **Pandu is named based on the concept of**
   - a. Type of Nidana exposed;
   - b. Prakriti;
   - c. Pratyatma Lakshana;
   - d. Nature of discomfort

   Answer -(d)
3. **Sandhimoksha is the name given based on the concept of**
   - a. Disturbance of physical activity;
   - b. Dhatu afflicted;
   - c. Structural damage;
   - d. Simile

   Answer -(c)
4. **Panatyaya is the name given based on the concept of**
   - a. Type of Nidana exposed;
   - b. Type of discomfort;
   - c. Prakriti;
   - d. Dhatu afflicted

   Answer -(a)
5. **Adhyavata is the name given based on the concept of**
   - a. Pratyatma Lakshana;
   - b. Incidence;
   - c. Type of Nidana exposed;
   - d. Type of discomfort

   Answer -(b)

***

Bija, Bijabhaga and Avayava Dushti

3

Learning objectives

- ⇨ To learn the meaning of Bija, Bijabhaga and Bijabhaga Avayaya
- ⇨ To learn the understanding of Bijabhaga Dushti in present era

It is a well known fact that off springs are produced due to the union of healthy *Shukra* and *Shonita*. In case of abnormality observed in either *Shukra* (sperm) or *Shonita* (ovum), there can be abnormality observed in the fetus and new born children. This set of diseases are categorised under *Adibala Pravritta Vikara* as per *Sushruta* and *Sahaja Vikara* as per *Vagbhata*.

तत्रोच्यते-यस्य यस्य ह्यङ्गावयवस्य बीजे बीजभाग
उपतप्तो भवति, तस्य तस्याङ्गावयवस्य विकृतिरुपजायते,
नोपजायते चानुपतापात्; Ca.Sha. – 3/17

The part of *Bija, Bijabhaga* or *Bijabhagavayava* gets afflicted during the embryogenesis, the structures originated from those abnormal parts will be afflicted in the offspring. If both *Shukra* and *Shonita* becomes destroyed, there will be no offspring.

- ⇨ If *Shukra* or *Shonita* of the parents is getting afflicted, then the part of the offspring related to abnormal *Shukra* or *Shonita* of the parent will be afflicted.
- ⇨ If particular part of *Bijabhaga* is abnormal, then the respective part of the body having abnormality will be afflicted in the progeny and the same can be seen in the child.

यतस्तु कात्स्न्येनाविनश्यन् विकृतिमापद्यते,
तदनुव्याख्यास्यामः-यदा स्त्रिया दोषप्रकोपणोक्तान्या-
सेवमानाया दोषाः प्रकुपिताः शरीरमुपसर्पन्तः
शोणितगर्भाशयावुपपद्यन्ते, न च कात्स्न्येन
शोणितगर्भाशयौ दूषयन्ति, तदेयं गर्भं लभते स्त्री;
तदा तस्य गर्भस्य मातृजानामवयवानामन्यतमोऽवयवो
विकृतिमापद्यत एकोऽथवाऽनेके, यस्य यस्य
ह्यवयवस्य बीजे बीजभागे वा दोषाः प्रकोपमापद्यन्ते,
तं तमवयवं विकृतिराविशति।
यदा ह्यस्याः शोणिते गर्भाशयबीजभागः प्रदोषमापद्यते,
तदा वन्ध्यां जनयति; यदा पुनरस्याः शोणिते
गर्भाशयबीजभागावयवः प्रदोषमापद्यते, तदा पूतिप्रजां
जनयति; यदा त्वस्या; शोणिते गर्भाशयबीजभागावयवः
स्त्रीकराणां च शरीरबीजभागानामेकदेशः प्रदोषमापद्यते,
तदा स्त्र्याकृतिभूयिष्ठामस्त्रियं वार्ता नाम जनयति,
तां स्त्रीव्यापदमाचक्षते॥30॥ Ca.Sha. – 4/30

If the woman is conceived when her ovum and uterus were not completed vitiated but simply affected by the circulating *Dosha* aggrevated because of her indulgence in *Dosha* aggrevating regimen, one or many organs of the fetus derived from maternal source (*Matrija*) such as skin, blood etc get deformed. These vitiated *Dosha* may afflict the *Bija* (division of sperm or ovum which is responsible for the production of a particular organ – the nearest term in modern science is chromosomes in genetics or *Bijabhaga* (a part of *Bija* i.e. gene) by which corresponding organs derived from these *Bija* and *Bijabhaga* get deformed.

When the *Bijabhaga* (part of *Bija*) in the ovum of the mother which is responsible for the production of uterus is excessively vitiated, then the mother gives birth to a sterile child. When the *Bija Bhaga Avayava* (a fraction of part of the *Bija*) in the ovum of the mother is responsible for the production of uterus is excessively vitiated, then she gives the birth to *Putipraja* (who delivers dead child). When the *Bijabhaga Avayava* which is responsible for the production of uterus and also the portions of the *Bijabhaga* which are responsible for the production of organs that characterise female, breasts, genital organs, hairs etc in the ovum gives birth to the child who is not completely female but only having feminine characters in abundance. Such a progeny is termed as *Vaartaa*.

एवमेव पुरुषस्य यदा बीजे बीजभागः प्रदोषमापद्यते,
तदा वन्ध्यं जनयति; यदा पुनरस्य बीजे बीजभागावयवः
प्रदोषमापद्यते, तदा पूतिप्रजं जनयति; यदा त्वस्य बीजे
बीजभागावयवः पुरुषकराणां च शरीरबीजभागानामेकदेशः
प्रदोषमापद्यते, तदा पुरुषाकृतिभूयिष्ठमपुरुषं तृणपुत्रिकं
नाम जनयति; तां पुरुषव्यापदमाचक्षते॥31॥

Ca.Sha. – 4/31

When the part of the *Bija* is responsible for the production of the sperm in the fetus is excessively vitiated, then this gives birth to a sterile child. When the *Bijabhaga Avayava* (only a fraction of the part of the *Bija*) which is responsible for the production of the sperm is excessively vitiated, then this gives birth to *Putipraja* (whose child dies before delivery). When the *Bijabhaga Avayava* responsible for the production of sperm and also portions of the *Bijabhagas* which are responsible for the production of organs that characterise a male, are excessively vitiated, then this gives birth to a child who is not a complete male but only having the masculine characters in abudance. Such a child is known as *Trina Putri*.

Phenotypic sex determination begins with genetic sex and it is further determined by chromosomal sex which further determines the gender of the individual. The nature of gonad present in the individual determines the differentiation or regression of the internal ducts (Mullerian and wolffian ducts) which further determines the phenotypic gender differentiation.

In the present context, the term *Bija* refers *Purusha Bija* or *Stri Bija* (sperm or ovum). The term *Bijabhaga* refers to the part of sperm or ovum (chromosomes). The term *Bijabhaga* refers to the part of the chromosome of sperm or ovum i.e. gene.

Genotype gives the overall hereditary information and phenotype is an organism's actual observed phenomena‐ such as morphology, development or behaviour of an individual. It is observed that there will be transformation of certain characters from one individual to their offspring. The study which deals with these informations such as colour of the hair, height, weight, body structure, skin colour etc is being termed as genetics.

The word gene is derived from Greek word genesis meaning 'birth' or genos meaning origin. A gene is the molecular unit of heredity of the living organism. Living beings depend on genes as they specify all proteins and functional RNA chains. Genes hold the information to build and maintain an organism's cells and pass genetic traits to the offspring.

Some informations carried through genes to the offsprings are type of blood, risk of transmission of the disease or thousands of biochemical processes that comprise life. Abnormal *Dosha* if enter the *Bija, Bijabhaga* and *Bijabhaga Avayava* leads to the manifestation of the disease of affected part of *Bija, Bijabhaga* and *Bijabhaga Avayava* in the offspring.

Current understanding of Bija, Bijabhaga and Bijabhagavayava Dushti

For the purpose of convenience of the discussion, genetic diseases are covered under

1. **Cytogenetic (karyotypic) defects:** chromosomal abnormalities such as Down's syndrome, Klinefelter syndrome etc
2. **Single gene defects:** Mendelian disorders where in mutations in genes can be observed such as sickle cell anemia, glycogen storage disease, Wilson's disease, muscular dystrophies etc
3. **Multifactorial inheritance disorders** which arise from genetic composition as well as environmental influence such as cleft lip, pyloric stenosis, diabetes mellitus,

congenital heart disease, coronary heart disease

Cytogenetic defects

- Human germ cells (sperms and ova) contain 23 chromosomes (haploid or N) while all the nucleated somatic cells of the human body contain 23 pairs of chromosomes (diploid or 2N). Among these chromosomes, 44 chromosomes are considered as autosomes and 2 chromosomes are called as allosomes or sex chromosomes. Allosomes are XX in females and XY in males as these chromosomes will determine the gender of the human beings.
- The branch which deals with the study of the human chromosomal abnormalities is termed as cytogenetics.
- Let us see few examples where in genetic defects can be seen.
    - ☐ **Down's syndrome:** this is also called as trisomy 21. In 95% of the cases of Down's syndrome, occurs due to nondisjunction during meiosis in one of the parents. It is the commonest cause of mental retardation. The incidence of producing offspring with Down's syndrome rises in mothers over 35 years of age.
    - ☐ **Klinefelter's syndrome:** is the most important example of sex chromosome trisomy. About 80% of the cases will have 47 chromosomes with XXY karyotype. These patients will have testicular agenesis.
    - ☐ **Turner's syndrome:** is an example of monosomy 45, XO. This occurs most commonly due to the loss of X chromosome in paternal meiosis.

      Usually, the patients of Turner's syndrome will have undeveloped feminine body.

Current understanding of Bija, Bijabhaga and Bijabhagavayava Dushti based on the concept of Ayurveda:

कस्माद्द्विरेताः पवनेन्द्रियो वा संस्कारवाजी नरनारिषण्डौ।
वक्री तथेर्ष्याभिरतिः कथं वा संजायते
वातिकषण्डको वा॥17॥ Ca.Sha. – 2/17

***Nara, Nari* and *Shandha*:** genetic and congenital factors responsible for the impotency in male and females.

***Pavanendriya*:** the testicles of the fetus are devoid of sperms which may be due to the obstruction in the passage of sperm at any location or undescended testis. In this occasion, the male child will be presented with the absence of testicles in the body (bilateral anorchia or vanishing testes syndrome). This is a rare disorder.

***Dvireta*:** If the fraction of sperm and ovum, responsible for the creation of germinal cells in the gonads of the fetus and if the sperm and ovum are equally divided during the process of conception, then the offspring will be *Dvireta* (hermaphrodite).

***Samskaravahi*:** If the testicles of the fetus are afflicted with *Vata* then the offspring becomes aspermic. It may be due to the obstruction of seminal passage by vitiated *Vata* or due to structural abnormality.

***Vakri* (hypospadias):** weakness in the sperms of male partner and irregular position of the female during the intercourse make the offspring having hypospadias.

***Vataja Shandha*:** Being afflicted with *Vata* and Agni, and the testicles of the fetus get destroyed there may be emasculation in the offspring.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya and Ashtanga Sangraha excerpts and other Ayurvedic literatures
2. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005

Key points of the chapter

- यस्य यस्य ह्यङ्गावयवस्य बीजे बीजभाग उपतप्तो भवति, तस्य तस्याङ्गावयवस्य विकृतिरुपजायते Ca.Sha. – 3/17 The above verse illustrates the significance of hereditary transmission of defects of the forefathers to their offspring. In other words, this Shloka highlights the genetic diseases in Ayurveda literature.
- As per the current understanding of genetics in current era, cytogenetic defects, single gene defects, multifactorial inheritance disorders are also discussed in this chapter. Brief description of Down's syndrome, Klinefelter's syndrome, Turner's syndrome are discussed.
- Nara, Nari and Shandha, Dvireta, Samskaravahi, Vakri etc are also discussed in this chapter.

Probable questions may be asked in the examination

Short essays

- Explain Bijadushtijanya Vikara
- Describe Bija, Bijabhaga and Bijabhagavayava Dushtijanya Vyadhi
- Describe Bijadushti and how it causes disease?
- Beejadushti
- Write Bijadushti Janita Roga

Short answers

- Bijadushti Hetu
- Bijadushti

MCQs

1. **Down's syndrome is associated with the defect in ....chromosome.**
    a. 12th ;
    b. 21st ;
    c. 18th;
    d. 1st
    Answer -(b)
2. **Trisomy 21 is also known as**
    a. Klinefelter's syndrome;
    b. Turner's syndrome;
    c. Down's syndrome;
    d. Plummer Vinson syndrome
    Answer -(c)
3. **As per modern genetics, which of the following chromosome is necessary for the detection of the gender of the fetus?**
    a. X chromosome;
    b. Y chromosome;
    c. Both 1 and 2;
    d. None of the above
    Answer -(b)
4. **The genetic pattern XO is observed in**
    a. Klinefelter's syndrome;
    b. Turner syndrome;
    c. Down's syndrome;
    d. Muscular dystrophies
    Answer -(b)
5. **XXY karyotype pattern is observed in**
    a. Klinefelter's syndrome;
    b. Turner syndrome;
    c. Down's syndrome;
    d. Wilson's disease
    Answer -(a)
6. **Haploid cells contain ....number of chromosomes.**
    a. 23;
    b. 46;
    c. 69;
    d. 47
    Answer -(a)

***

Different Terminologies of Diseases

4

Learning objectives

- ⇨ To understand brief idea of hereditary diseases and application
- ⇨ To understand brief idea of acquired diseases and application
- ⇨ To understand brief idea of congenital diseases and application
- ⇨ To understand brief idea of multifactorial diseases and application
- ⇨ To understand brief idea of environmental diseases and application

The word heredity refers to the transmission of certain characters from the ancestors to the offsprings through the genes. The term hereditary diseases refers to the transmission of the disturbances from the ancestors to their offsprings through genes.

We know that cells or living beings will acquire the characters from their parents. Many elements will be transferred to the progeny such as physical characters, mental attributes, behavioural patterns, skin colour, pattern of illness. It depends upon the segregation and recombination of genes from the parents during the gamete formation at the time of meiosis.

Each cells of the human beings are having 46 chromosomes. Out of them 44 are known as autosomes and 2 chromosomes XX and XY are termed as allosomes or sex chromosomes. Each chromosome is having genes which are having long chain of DNA molecules which are copied and inherited across generations. DNA is made up of simple units that line up in particular order which carries information. The language used by DNA is termed as genetic code which allows genetic machinery to read the information in the genes in triplet set of codons. This information is the instructions for constructing and operating a living organism.

Gene may possess error. Genetic disease is caused by single error in a single gene in our DNA. The effects of the disease depend upon what the gene was supposed to do. Everyone has two copies of each gene. One copy on each of the chromosome pair and some disease require both copies to be damaged (recessive gene) and some need only one gene copy to be damaged (dominant gene). In recessive disease, genetic error usually needs to be inherited from both parents to get the disease and in dominant gene, the error need only inheritance from one parent in order to get the disease. The word carrier refers to the error in genes is present but the individual does not show clinical presentations related to that particular disease.

Classification

1. **X linked disease:** These are due to errors in the X chromosomes or allosomes
2. **Autosomal disease:** Caused by errors in genes on autosomes (chromosomes other than sex chromosomes)

Major classes of genetic diseases with different inherent patterns:

1. **Autosomal recessive genetic disease:** disease occurs when both copies of a gene on chromosome 1 to 22 is inherited from both parents e.g. cystic fibrosis, phenylketonuria, sickle cell anemia, albinism
2. **Autosomal dominant genetic disease:** disease occurs when a single damaged copy of a gene on chromosome 1 to 22 is inherited from either parent. The bad copy dominate the other good copy. e.g. Huntington's disease, achondroplasia (dwarfism)
3. **X linked recessive genetic disease:** one gene error on X chromosome cause disease in men who have only one copy of X. e.g. Hemophilia, Duchenne muscular dystrophy
4. **X linked dominant genetic disease:** A single gene error on X chromosome cause disease in both men and women. Males are having only one copy of X and females will have copies of XX. The bad copy dominates the good copy. X linked dominant diseases are rare than x linked recessive disease.

Down's syndrome, sickle cell disease, colour blindness etc 4,100 diseases are identified which are considered as genetic diseases. These set of diseases do not respond to any of the treatment. This is usually associated with medical maladies and shorter life span.

Sometimes, even an autosomal dominant disease can arise surprisingly when neither parent is suffering from the disease. This can be considered to be occurring due to the gene mutation. All types of genetic diseases occur at birth. It will be inherited from parents to the offsprings through DNA, cannot be caught later in life. Genetic tests can determine whether or not a person has the disease, even as early as in fetus by antenatal testing for genetic disease.

Acquired Diseases

These set of diseases occurring in the individuals due to the factors acting upon the individuals or originating outside the organism, but they are not inherited. This disease develops after the birth of the individual or due to the response to the antigen. These diseases are manifested due to the influences like food, air, human responses etc outside the organism. Let us learn this concept with certain examples.

- ⇨ **In relation to food and drinks** – excess consumption of alcohol leads to the clinical condition called alcoholic liver disease; reduced consumption of food substances having vitamin C leads to the manifestation of scurvy; excess consumption of water leads to the manifestation of water intoxication; excess consumption of more spicy substances leads to the manifestation of acid peptic disease etc
- ⇨ **In relation of various regimen–** sudden lifting of heavy weight objects without bending the knee leads to the manifestation of acute sciatica syndrome; exposure to smoky areas or in residing cold climate leads to the manifestation of bronchial asthma; exposure to active and passive smoking leads to the manifestation of chronic obstructive pulmonary disease or carcinoma of lungs etc.
- ⇨ **In relation to various infections–** consumption of contaminated water leads to the manifestation of enteric fever, hepatitis A infection, cholera or food poisoning; droplet infection spread such as recent outbreak of COVID-19; unprotected sexual intercourse with the person suffering from sexually transmitted infections prone to be afflicted with sexually transmitted infections etc.
- ⇨ In above said examples, no known hereditary cause can be identified and all the causes are said to be responsible for the manifestation of the diseases when they are exposed to the causative factors after birth.

Congenital Diseases

The term congenital diseases are the set of the diseases that exist in human beings right from birth. These diseases can also be seen before birth which can be identified by ultrasound scan during the fetal life. These diseases are characterised by structural deformities which are also known as congenital anomalies.

Causes of congenital diseases:

- ⇨ Genetic abnormalities

- ⇨ Abnormal uterine environment
- ⇨ Errors of mitosis during the fetal life
- ⇨ Infection occurring in the pregnant mother
- ⇨ Inherited metabolic disorder
- ⇨ Chromosomal abnormalities

The outcome of the disease may depend upon complex interaction between prenatal deficit and postnatal environment.

E.g. Fallot's tetralogy, cleft lip, cleft palate, oesophageal atresia, imperforate anus, imperforate hymen, transposition of great vessels, osteogenesis imperfecta, hyperammonia syndrome etc

Multifactorial Diseases

These set of diseases are caused not by a single gene mutation, but by a combination of multiple etiological factors. They involve both a combination of genetic abnormalities and environmental factors. E.g. Alzheimer's disease, obesity, hypertension, diabetes mellitus, infertility, irritable bowel syndrome, ischemic heart disease, infertility etc. Let us learn this concept with one or two examples.

- ⇨ If the person is suffering from ischemic heart disease (IHD), he may have exposure to multiple aetiological factors. The different probable risk factors of ischemic heart disease are anemia, any condition leading to tachycardia such as hypertension or thyrotoxicosis or coronary atherosclerosis or diabetes mellitus or cigarette smoking.
- ⇨ If the person is suffering from bronchial asthma, he may have exposure to multiple aetiological factors. The different risk factors for the development of bronchial asthma are exposure to very cold environment or upper respiratory tract infection or exposure to smoke and dust etc or exposure to petrol or diesel smell or cleaning the house and exposure to house hold dust or the consumption of curds or banana etc.
- ⇨ If we analyse above said examples, it is little bit difficult to predict the exact cause of manifestation of the disease at a particular point of time. The person suffering from above said disease may develop episode of the illness due to exposure to one type of aetiological factor and next episode of the illness may manifest due to the exposure to another type of aetiological factor.

Traumatic Diseases

These diseases are caused by external factors that cause trauma or injury to the organism. Trauma can be due to physical agents like sharp or blunt instruments, road traffic accidents, thermal injury or electrical injury, chemical injury. A serious injury or shock to the body can be present due to violence or accident. The range of the disease may vary from trivial symptom such as pain to permanent disability or deformity or even mortality too. The clinical features of trauma depend upon the nature of the injury to the body, part of the body injured in trauma, the amount of fluid loss from the body, presence of comorbid conditions such as diabetes mellitus or hypertension or anemia, nutritional status of the patient, appropriate management of the patient etc. Let us learn this concept with few examples.

- ⇨ Let us take the example of **head injury** where in depending upon the nature of injury (sharp or blunt) and area of head injured, the person will be presented with varied clinical presentations such as altered state of consciousness (delirum, stupor, semicoma or coma), post traumatic amnesia (loss of memory following trauma), vomiting without nausea, epileptic fits (seizures), swelling of the head and pain in the head region, bleeding or watery discharge from nose, ears and mouth. If the person is having progressively worsening of the symptoms, he may be presented with Jacksonian fits (unilateral convulsions) may indicate middle meningeal hemorrhages. Proper assessment of the patient in terms of neurological examination is of utmost importance in this situation.
- ⇨ Let us take the example of **spinal cord injury**. Depending upon the location of injury, the person may have typical clinical presentation. When the person is getting injury to the neck, he will be presented with reduced or loss of strength in all four limbs. When the person is having injury to the thoracic vertebra, he will be presented with paraparesis or paraplegia (reduced or loss of strength in both lower limbs) with sensory symptoms with definable sensory level; when the person is having the trauma in the lumbar level, he will be presented with pain resembling sciatica syndrome along with sensory level and trauma in the sacral vertebra, the person will be presenting with only parapersis or paraplegia. Apart from these symptoms, they may also have worsening of pain on performing manoeuvres increasing intra spinal pressure, sensory symptoms in the affected limb, distended bladder, incontinence of urine and priapism (persistent erection of penis) can also be seen.
- ⇨ In case of injury to a **specific joint**, the person with this type of injury will be presented with pain of the injured joint, loss of function of affected joint and deformity or swelling of the affected part can be seen.
- ⇨ In case of injury to the **chest**, careful history should be taken because of presence of major viscera involving cardiorespiratory function. But, detailed case taking should be avoided initially, so that saving the life of the patient is of paramount importance. The commonest chest injuries encountered are road traffic accidents and stab injuries. The injury may range from simple bruising to crushing injuries. The person may present with chest pain, short paroxysmal cough, hemoptysis, features of hypovolemic shock, features of lung contusion, features of aortic rupture.
- ⇨ In case of **abdominal injuries**, careful history should be taken, detailed case taking should be deferred, so that saving the life of the patient is of utmost priority. The person may have clinical presentation depending upon the site of injury such as pain abdomen, hematemesis or hematochezia or hematuria or swelling of the abdomen etc.

Environmental Diseases

In the present days, the term 'environmental diseases' comprises all such diseases caused by progressive deterioration in the environment, most of which are man made. The diseases are manifested due to contamination of air, water and food by infectious or parasitic organisms. Certain occupational hazards also come under the umbrella of environmental diseases due to the overexposure to certain pollutants in the occupation of an individual. Further, certain environmental diseases are confined to certain geographic boundaries.

The following are the important factors which led to environmental degradation as follow:

1. Population explosion
2. Urbanisation of rural and forest land to accommodate the increasing numbers
3. Accumulation of wastes – biomedical or plastic wastes or food residues
4. Unsatisfactory disposal of radioactive wastes
5. Industrial effluents and automobile exhausts
6. Domestic waste improper disposal

Some of the important environmental diseases will be discussed in this section.

Environmental pollution: any agent– chemical, physical or microbial, that alters the composition of environment is called pollutant.

- ⇨ Depletion of ozone layer in the outer space from pollutants such as chlorofluro carbons and nitrogen dioxide produced in abundance by day today activities on our planet due to industrial effluent and automobile exhausts

- ⇨ A vast variety of pollutants inhaled daily some will cause trivial irritation to upper respiratory pathways, while others may lead to acute or chronic injury to lungs and some others may even cause lung cancer.
- ⇨ Some pollutants prevalent in certain industries such as coal dust, silica or asbestos leading to the respiratory manifestations.
- ⇨ In certain highly polluted cities where coal consumption and automobile exhaust accumulate in the atmosphere lead to the appearance of smog which is further leading to the respiratory complications.

Tobacco smoking: tobacco contains numerous toxic chemicals having adverse effects varying from minor throat irritation to carcinogenesis.

Table 4.1: Adverse effects on the body and exposure to different toxic materials

S.No.	Adverse effects	Constituents
1.	Carcinogenesis	Tar, polycyclic aromatic hydrocarbons, nitrosamines
2.	Tumour promoters	Nicotine, phenol
3.	Irritation and toxicity to respiratory mucosa	Formaldehyde, nitrogen oxide
4.	Reduced oxygen transport	Carbon monoxide

The major diseases accounting for higher mortality of tobacco smokers include

- ⇨ Coronary heart disease
- ⇨ Cancer of the lung
- ⇨ Other cancers such as cancer of upper aerodigestive tract such as lips, oral cavity, larynx, oesophagus), pancreas, urinary bladder and kidney
- ⇨ Chronic obstructive pulmonary disease
- ⇨ Peptic ulcer
- ⇨ Early menopause in smoker women

Lead poisoning

Lead poisoning may occur in children or adults due to accidental or occupational exposure.

Causes of lead poisoning:

- ⇨ In children,
  - ☐ Chewing of lead containing furniture items, toys or pencils
  - ☐ Eating of lead paint flakes from walls
- ⇨ In adults,
  - ☐ Occupational exposure due to spray painting
  - ☐ Recycling of automobile batteries
  - ☐ Mining and extraction of the lead
  - ☐ Accidental exposure by contaminated water supply, house freshly coated with lead paint, sniffing of lead containing petrol

Pathology

Lead is absorbed through the GIT or lungs. The absorbed lead is distributed in two types of tissues

- ⇨ Bones, teeth, nails and hair representing relatively harmless pool of lead. About 90% of the absorbed lead is accumulating in developing metastasis of bones in children and appears as areas of increased bone densities on X ray. Lead lines are also seen in gingiva.
- ⇨ Brain, liver, kidneys, bone marrow accumulate remaining 10% lead which is directly toxic to these organs. These are excreted via kidneys.

Clinical features: clinical features of lead toxicity can lead to the functional disturbances among the following.

- ⇨ **Nervous system:**
  - ☐ In children, lead encephalopathy, oedema of the brain, flattening of the gyri and compression of the ventricles
  - ☐ In adults, demyelinating peripheral motor neuropathy where in involvement of radial nerve and common peroneal nerves leading to wrist drop and foot drop respectively
- ⇨ **Hemopoietic system:**
  - ☐ Microcytic hypochromic anemia due to inhibition of the enzymes
  - ☐ Prominent basophilic stippling of the erythrocytes
- ⇨ **Kidneys:**
  - ☐ **Lead nephropathy:**
- ⇨ **Gastro intestinal tract:**
  - ☐ Features of acute abdomen presented as lead colic

Carbon monoxide poisoning

- ⇨ Carbon monoxide is a colourless and odourless gas produced by incomplete combustion of carbon.
- ⇨ Sources of carbon monoxide
  - ☐ Automobile exhaust
  - ☐ Burning of fossil fuel in industries or at home
  - ☐ Tobacco smoke

Pathology: Hemoglobin is having affinity to carbon monoxide 200 times higher than oxygen. When carbon monoxide is mixed with haemoglobin leading to the increase of carboxyhaemoglobin in the body. This will interfere with the release of oxygen from oxyhaemoglobin leading to the further deterioration of the patient due to tissue hypoxia

Clinical features of carbon monoxide poisoning

- ⇨ **Acute CO poisoning:** sudden development of brain hypoxia characterised by oedema and petechial hemorrhages
- ⇨ **Chronic CO poisoning:** presents with non specific changes of slowly developing hypoxia of brain

Environmental chemicals:

- ⇨ A large number of chemicals are found as contaminants in the ecosystem, food and water supply and find their way into the food chain of the man. These substances exert their toxic effects depending upon their mode of absorption, distribution, metabolism and excretion. Some of the chemicals are directly toxic to the cells and some others cause damage to the cells by the intermediary products or metabolites.
- ⇨ Some common examples of environmental chemicals causing health hazards in the human beings are as follow:
  - ☐ **Agriculture chemicals–** pesticides, fungicides, herbicides and other organic fertilisers which may act as acute poisoning as well as long time health hazard.
    - ⇨ Acute poisoning by organophsphate insecticides is responsible for sudden death as it is well known as accidental or suicidal poison which inhibits acetyl cholinesterase.
    - ⇨ Chronic human exposure to low level agricultural chemicals leading to the manifestation of cancer, chronic degenerative diseases, congenital malformations and impotence.
  - ☐ **Volatile organic solvents and vapours–** leading to the acute toxicity or chronic health hazard by inhalation or ingestion. The examples include methanol, chloroform, kerosene, petrol, benzene, ethylene glycol, toluene etc
  - ☐ **Metals–** mercury, arsenic, cadmium, iron, nickel and aluminium are leading to either acute toxicity or chronic ailments
  - ☐ **Aromatic hydrocarbons–** used in several preservatives, herbicides and antibacterial agents may lead to chronic health hazard

- ☐ **Cyanide–** a chemical released by combustion of plastic, silk and seeds of apricots and wild cherries. This chemical will kill the individual by blocking the cellular respiration by binding to mitochondrial cytochrome oxidase

Thermal and electrical injury: temperature below 35°C is termed as hypothermia and temperature above 41°C is termed as hyperthermia. Hazards that can be seen in hypothermia are focal injury such as frost bite, chill blains, claudication, systemic injury and death. Hyperthermia can manifest in the form of thermal burns, heat exhaustion, heat stroke. Severe sweating, muscle cramps, shock are some of its presentations.

Radiation injury: Radiation injury can happen due to exposure to radiation by ultra violet rays, X rays, electromagnetic and infrared radiation. Among them, hazards by X rays and ultraviolet rays are more significant. Acute cell killing, malignant transformation of cell, genetic damage by mutation which passes genetic defect to next generation. Ionising radiation is widely used in diagnostic purposes as well as for radiotherapy for malignant tumours. Radiation induced cell death is mediated by radiolysis of water in the cell with generation of toxic hydroxyl radicals. During radiotherapy, some normal cells coming in the field of radiation are also damaged. In general, radiation induced tissue injury predominantly affects endothelial cells of small arteries and arterioles causing necrosis and ischemia. Some hazards are as follow:

- ⇨ **Skin:** Radiation dermatitis, cutaneous carcinoma
- ⇨ **Lungs:** Interstitial pulmonary fibrosis
- ⇨ **Heart:** Myocardial fibrosis, constrictive pericarditis
- ⇨ **Kidney:** Radiation nephritis
- ⇨ **GIT:** stricture of small intestine and oesophagus
- ⇨ **Gonads:** testicular atrophy in males and destruction of ovaries in females
- ⇨ **Hemopoietic system:** Bone marrow depression
- ⇨ **Eye:** Cataract

Ultraviolet rays: acute skin injury as sunburns, cutaneous cancer, solar keratosis.

Nonionising radiations like electromagnetic radiation produced by microwave ovens, radio, diathermy, ultrasound do not cause tissue damage.

Chapter Resources

1. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
2. The Merck's manual by Robert S Porter & Justin L Kaplan, 19th Edition, Merck Sharp & Dohme Corp, 2011

Key points of the chapter

- ⇨ This chapter discusses the introduction to hereditary diseases, acquired diseases, congenital diseases, multifactorial diseases, traumatic diseases, environmental diseases
- ⇨ In hereditary diseases, primary defect is seen in genes which are seen in DNA which is present in nucleus. Each of the human beings contain 46 chromosomes, 44 chromosomes are autosomes and 2 chromosomes which are determining the gender are known as allosomes. Depending upon the nature of defect present in genes, two types of diseases are being mentioned namely, X linked disease (defect seen in sex chromosomes) and autosomal disease (defect seen in chromosomes other than sex chromosomes)
- ⇨ Acquired diseases usually manifested in individuals due to the factors acting upon individuals or originating outside the organism. These will be manifested due to influence of food, air etc.
- ⇨ Congenital diseases are occurring due to developmental defect in the fetal life. Hence, these diseases are seen since birth itself. Cleft lip, cleft palate etc are the examples.
- ⇨ Multifactorial diseases occur due to multiple etiological factors. Gene mutation or environmental factors together may be responsible for the disease occurrence. E.g IHD or bronchial asthma.
- ⇨ Traumatic diseases are caused by external factors which cause trauma to the body such as blunt trauma or road traffic accidents or thermal injury or electrical injury.
- ⇨ Environmental diseases – are manifested due to the progressive deterioration of environment which is mostly man made error. For example, population explosion, urbanization or accumulation of waste such as plastic waste or industrial waste products etc.

Probable questions may be asked in the examination

Short essays

- ⇨ Describe Paryavarana Pradoshaja Vikara
- ⇨ Explain environmental diseases
- ⇨ Explain hereditary diseases
- ⇨ Short answers
- ⇨ Write a short note on hereditary diseases
- ⇨ Write a short note on congenital diseases
- ⇨ Write a short note on acquired diseases
- ⇨ Write a short note on traumatic diseases
- ⇨ Write a short note on multifactorial diseases
- ⇨ Write a short note on environmental diseases
- ⇨ Congenital diseases

MCQs

1. **Frequent exposure to automobile exhaust may lead to ....poisoning.**
   a. Carbon dioxide;
   b. Carbon monoxide;
   c. Lead poisoning;
   d. Tobacco
   Answer -(b)
2. **Cystic fibrosis is an example of**
   a. Acquired disease;
   b. Multifactorial disease;
   c. Congenital disease;
   d. Hereditary disease
   Answer -(d)
3. **Tetralogy of Fallot is an example of**
   a. Acquired disease;
   b. Multifactorial disease;
   c. Congenital disease;
   d. Hereditary disease
   Answer -(c)
4. **Which of the following disease is not categorized under hereditary disease?**
   a. Duchenne muscular dystrophy;
   b. Hemophilia;
   c. Huntingson's disease;
   d. Imperforate hymen
   Answer -(d)
5. **Which of the following is X linked recessive genetic disease?**
   a. Hemophilia;
   b. Duchenne muscular dystrophy;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)

***

5

ICD Classification of Diseases

Learning objectives

- ⇨ To know the history of evolution of ICD – 11
- ⇨ To know about the significance of ICD – 11
- ⇨ To know the structure of ICD – 11
- ⇨ To know the peculiarities of ICD – 11
- ⇨ To know the history of DSM and evolution of DSM classification

⇨ ICD– 11 is the 11th revision of the International Classification of Diseases. This will replace ICD – 10 as the global standard for coding health information and causes of death. This is developed and regularly updated by World Health Organisation (WHO). This is developed by 300 specialists from 55 countries divided into 30 groups, with an additional 10,000 proposals from people all over the world. Following an alpha version in May 2011 and beta draft in May 2012, stable version of the ICD-11 was released on 18th June 2018 and officially endorsed by all WHO members during 72nd World Health Assembly on 25th May 2019.

⇨ ICD– 11 is a large taxonomy consisting of tens of thousands of entities, also called classes or nodes. An entity can be anything that is relevant to health care. It usually represents a disease or pathogen, but it can also be an isolated symptom or (developmental) anomaly of the body. There are also classes for reasons for contact with health services, social circumstances of the patient, and external causes of injury or death. The collection of all ICD-11 entities is called the Foundation Component. From this common core, various subsets can be derived, for example, the ICD-O is a derivative classification used in oncology.

❑ The primary derivative of Foundation component is called the ICD-11 MMS, and it is this system that is commonly referred ICD – MMS (Mortality and Morbidity statistics). Both Foundation component and ICD-MMS can be viewed online on WHO's website.

⇨ ICD- 11 will officially come into effect on 1st January 2022, at which time member nations may begin reporting morbidity and mortality statistics using the ICD-11 nosology. Each country chooses when to adopt ICD-11 and WHO has acknowledges that not may countries are likely to adopt quickly i.e, begin using the ICD-11 by the time of its launch.

History of ICD

⇨ The first international classification edition known as the International List of causes of death was adopted by International Statistical Institute in 1893.

⇨ **World Health Organisation was entrusted with ICD at its creation in 1948 and published ICD– 6**, which incorporated morbidity for the first time. WHO nomenclature regulations adopted in 1967 stipulated that member states use the most recent ICD revision for the statistics related to morbidity and mortality. The ICD has been revised and published in series of editions to analyse recent advances in health and medical sciences.

⇨ ICD – 10 was formulated in May 1990 by 43rd World Health Assembly. It is cited in more than 20,000 articles and used in more than 100 countries across the globe.

⇨ **A version of ICD – 11** was released in 18th June 2018 to allow member states to prepare for implementation including translation of ICD into their national languages.

Purpose of ICD

⇨ The main purpose of ICD is to systematic recording analysis, interpretation and comparison of mortality and morbidity data collected in different countries or areas and at different times. It is used to translate diagnosis of diseases and other problems from words into alphanumerical code which permits easy storage, retrieval and analysis of the data.

⇨ ICD is helpful in determining the health trends and statistics across the globe and the international standard for reporting diseases and health conditions.

⇨ It is the diagnostic classification for all clinical and research purposes. It defines the universe of diseases, disorders, injuries and other health related conditions. It is useful in

- ❑ Easy storage, retrieval and analysis of health information for evidence based decision making
- ❑ Sharing and comparing health related information between hospitals, regions, settings and countries
- ❑ Data comparison in the same location across different time periods.

Uses of ICD:

⇨ Monitoring the incidence and prevalence of the diseases

⇨ Observing the reimbursements and resource allocation trends

⇨ Keeping track of safety and quality guidelines

⇨ Counting of deaths and diseases, injuries, symptoms, reasons for encounter, factors that influence health status and external causes of disease.

Structure of ICD-11

The Foundation Component represents the entire ICD-11 universe. It is a multidimensional collection of tens of thousands of interconnected entities, also called classes or nodes. Every node of the Foundation has a unique entity id. A node can have multiple child and parent nodes. For example, pneumonia can be categorised as lung infection, but also as a bacterial or viral infection (i.e. by site or by etiology). Thus, the node Pneumonia (entity id: 142052508) has two parents: Lung infections (entity id: 915779102) and certain infectious or parasitic diseases (entity id: 1435254666). The Pneumonia node in turn has various children including bacterial pneumonia (entity id: 1323682030) and viral pneumonia (entity id: 1024154490).

From the Foundation Component, a linearization can be derived. A Linearization is a subset of entities from the Foundation, optimized for a particular field or situation. The website of the WHO compares this to a store of books. The Foundation is the entire store, from which a therapist can make a selection that fits their profession. For instance, oncologist will need different books than an ophthalmologist.

As of 2020, the website of the WHO features six officially approved ICD-11 linearizations.

1. The ICD-11-MMS (or simply the ICD-11)
2. The Primary Care Low resource setting Linearization
3. The Dermatology specialty Linearization
4. The Neurology specialty Linearization
5. The Ophthalmology specialty Linearization
6. The International Classification of diseases for Oncology (ICD-O)

ICD– 11 classification – mortality and morbidity statistics (ICD-MMS)

⇨ **The ICD-11 MMS** is the primary derivative of the Foundation Component, and it is this taxonomy that is commonly referred to and recognized as "the ICD-11". The abbreviation is variously written with or without a hyphen between 11 and MMS ("ICD-11 MMS" or "ICD-11-MMS"). MMS stands for Mortality and Morbidity Statistics.

⇨ **The ICD-11** MMS takes the form of a hierarchy consisting of tens of thousands of entities. Entities can be chapters, blocks or categories. A chapter is a top level entity of the hierarchy; the MMS contains 28 of them (see Chapters section below). A block is used to group related categories or blocks together. A category can be anything that is relevant to health care. Every category has a unique, alphanumeric code called an ICD-11 code, or just ICD code. Chapters and blocks never have ICD-11 codes, and therefore cannot be diagnosed. An ICD-11 code is not the same as an entity id.

⇨ Unlike the Foundation, all entities of a Linearization, including the MMS, must be mutually exclusive of each other and can only have a single parent. Therefore, the hierarchy of the MMS contains gray nodes. These nodes appear as children in the hierarchy, but actually have a different parent node. They originally belong to a different block or chapter, but are also listed elsewhere because of overlap. For example, the aforementioned Pneumonia (CA40) has two parents in the Foundation: "Lung infections" (location) and "Certain infectious or parasitic diseases" (etiology). In the MMS, Pneumonia is categorized in the "Lung infections", with a gray node in "Certain infectious or parasitic diseases". The same goes for injuries, poisonings, neoplasms, and developmental anomalies, which can occur in almost any part of the body. They each have their own chapters, but their categories also have gray nodes in the chapters of the organs they affect. For instance, the blood cancers, including all forms of leukemia, are in the "Neoplasms" chapter, but they are also displayed as gray nodes in the chapter "Diseases of the blood or blood-forming organs".

⇨ **The ICD-11** MMS also contains residual categories, or residual nodes. These are the 'Other specified' and 'Unspecified' categories, miscellaneous classes which can be used to code conditions that do not fit with any of the more specific MMS entities. In the ICD-11 Browser, residual nodes are displayed in a maroon color. Residual categories are not in the Foundation, and therefore are the only classes with derivative entity IDs: their IDs are the same as their parent nodes, with "/mms/otherspecified" or "/mms/unspecified" tagged at the end. Their ICD codes always end with Y for 'Other specified' categories, or Z for 'Unspecified' categories (e.g. 1C4Y and 1C4Z).

Below is a list of all chapters of the ICD-11 MMS, the primary linearization of the Foundation Component.

1. **1A00 – 1H0Z** – certain infectious or parasitic diseases
2. **2A00 – 2F9Z** – Neoplasms
3. **3A00 – 3C0Z** – Diseases of the blood or blood forming organs
4. **4A00 – 4B4Z** – Diseases of the immune system
5. **5A00 – 5D46** – Endocrine, nutritional or metabolic diseases
6. **6A00 – 6E8Z** – Mental, behavioural or neurodevelopmental disorders
7. **7A00 – 7B2Z** – Sleep wake disorders
8. **8A00 – 8E7Z** – Diseases of the nervous system
9. **9A00 – 9E1Z** – Diseases of the visual system
10. **AA00 – AC0Z** – Diseases of the ear or mastoid process
11. **BA00 – BE2Z** – Diseases of the circulatory system
12. **CA00 – CB7Z** – Diseases of the respiratory system

13. **DA00 – DE2Z** – Diseases of the digestive system
14. **EA00 – EM0Z** – Diseases of the skin
15. **FA00 – FC0Z** – Diseases of the musculoskeletal system or connective tissue
16. **GA00 – GC8Z** – Diseases of the genitourinary system
17. **HA00 – HA8Z** – Conditions related to sexual health
18. **JA00 – JB6Z** – Pregnancy, childbirth or the puerperium
19. **KA00 – KD5Z** – Certain conditions originating in the perinatal period
20. **LA00 – LD9Z** – Developmental anomalies
21. **MA00 – MH2Y** – Symptoms, signs or clinical findings, not elsewhere classified
22. **NA00 – NF2Z** – Injury, poisoning or certain other consequences of external causes
23. **PA00 – PL2Z** – External causes of morbidity or mortality
24. **QA00 – QF4Z** – Factors influencing health status or contact with health services
25. **RA00 – RA26** – Codes for special purposes
26. **SA00 – SJ3Z** – Supplementary chapter Traditional medicine conditions module 1
27. **VA00 – VC50** – Supplementary section for functional assessment
28. **X... - X...** - Extension codes

Unlike the ICD – 10 codes, the ICD-11 MMS codes never contain the letters I or O, to prevent confusions with numbers 1 and 0.

The changes observed in ICD-11 when compared to ICD-10 are as follow

General:

⇨ The ICD-11 MMS features a more flexible coding structure. In the ICD-10, every code starts with a letter, indicating the chapter. This is followed by a two digit number (e.g. P35), creating 99 slots per chapter, excluding subcategories and blocks. This proved enough for most chapters, but four are so voluminous that they span two letters: chapter 1 (A00–B99), chapter 2 (C00.0–D48.9), chapter 19 (S00–T98), and chapter 20 (V01–Y98). In the ICD-11 MMS, there is a single first character for every chapter. The codes of the first nine chapters begin with the numbers 1 to 9, while the next nineteen chapters start with the letters A to X. The letters I and O are not used, to prevent confusion. The chapter character is then followed by a letter, a number, and a fourth character that starts as a number (0-9, e.g. KA80) and may then continue as a letter (A-Z, e.g. KA8A). The ICD-11 Reference Guide notes that the WHO opted for a forced number as the third character to prevent the spelling of 'undesirable words'. In the ICD-10, each entity within a chapter either has a code (e.g. P35) or a code range (e.g. P35-P39). The latter is a block. In the ICD-11 MMS, blocks never have codes, and not every entity necessarily has a code, although each entity does have a unique id.

⇨ In the ICD-10, the next level of the hierarchy is indicated in the code by a dot and a single number (e.g. P35.2). This is the lowest available level in the ICD-10 hierarchy, causing an artificial limitation of 10 subcategories per code (.0 to .9). In the ICD-11 MMS, this is no longer the case: after 0-9, the list may continue with A-Z (e.g. KA62.0 – KA62.A). Then, following the first character after the dot, a second character may be used in the next level of the hierarchy (e.g. KA40.00 – KA40.08). This level is currently the lowest appearing in the MMS. The large amount of unused coding space in the MMS makes later updates possible without having to change the other categories, allowing for codes to remain stable.

⇨ The ICD-11 features five new chapters. The third chapter of the ICD-10, "Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism", has been split in two: "Diseases of the blood or blood-forming organs" (chapter 3) and "Diseases of the immune system" (chapter 4). The other new chapters are "Sleep-wake disorders" (chapter 7), "Conditions related to sexual health" (chapter 17, see section), and "Supplementary Chapter Traditional Medicine Conditions - Module I" (chapter 26, see section).

Mental disorders

The following mental disorders have been newly added to the ICD-11, but were already included in the American ICD-10-CM adaption:

- Binge eating disorder (ICD-11: 6B82;
- ICD-10-CM: F50.81), Bipolar type II disorder (ICD-11: 6A61; ICD-10-CM: F31.81),
- Body dysmorphic disorder (ICD-11: 6B21;
- ICD-10-CM: F45.22), Excoriation disorder (ICD-11: 6B25.1; ICD-10-CM: F42.4),
- Frotteuristic disorder (ICD-11: 6D34; ICD-10-CM: F65.81), Hoarding disorder (ICD-11: 6B24; ICD-10-CM: F42.3),
- and Intermittent explosive disorder (ICD-11: 6C73; ICD-10-CM: F63.81).

The following mental disorders have been newly added to the ICD-11, and are not in the ICD-10-CM:

- Avoidant/restrictive food intake disorder (6B83),
- Body integrity dysphoria (6C21),
- Catatonia (486722075),
- Complex post-traumatic stress disorder (6B41),
- Gaming disorder (6C51),
- Olfactory reference disorder (6B22), and
- Prolonged grief disorder (6B42).

Other notable changes include

- Distinct personality disorders have been collapsed into a single Personality disorder diagnosis, using a dimensional (as opposed to categorical) model; see Personality disorders section.
- All subtypes of Schizophrenia (e.g. paranoid, hebephrenic, catatonic) have been removed. Instead, a dimensional model is used with the category Symptomatic manifestations of primary psychotic disorders (6A25), which allows the coding for Positive symptoms (6A25.0), Negative symptoms (6A25.1), Depressive symptoms (6A25.2), Manic symptoms (6A25.3), Psychomotor symptoms (6A25.4), and Cognitive symptoms (6A25.5).
- Persistent mood disorders (F34), which consists of Cyclothymia (F34.0) and Dysthymia (F34.1), have been deleted.
- The ICD-10 differentiates between Phobic anxiety disorders (F40), such as Agoraphobia (F40.0), and Other anxiety disorders (F41), such as Generalized anxiety disorder (F41.1). The ICD-11 merges both groups together as Anxiety or fear-related disorders (1336943699).
- All Pervasive developmental disorders (F84) are merged into one category, Autism spectrum disorder (6A02), except for Rett syndrome, which is moved to the developmental anomalies chapter (LD90.4).
- Hyperkinetic disorders (F90) is renamed Attention deficit hyperactivity disorder (6A05), and a distinction in subtypes is made between predominantly inattentive (6A05.0), predominantly hyperactive-impulsive (6A05.1), and combined (6A05.2). Hyperkinetic conduct disorder (F90.1) has been removed.
- Acute stress reaction (F43.0) has been moved out of the mental disorder chapter, and placed in the chapter "Factors influencing health status or contact with health services" (QE84). Thus, in the ICD-11, Acute stress reaction is no longer considered a mental disorder.

Aside from the updates made for the ICD-11, the WHO has developed an ICD-11 version of the Clinical descriptions and diagnostic guidelines (CDDG), although it has not yet been published. A book of the same name was released in 1992 for the ICD-10, which was also known as the "Blue Book". It contains expanded definitions and diagnostic criteria for the mental disorders, whereas the ICD-10/-11 mental disorders chapters contain only short summaries. The ICD chapters are meant as a quick reference point, whereas the CDDG is meant for extensive diagnosing by health care professionals. To differentiate the old and the new version, the newest revision is called the ICD-11 CDDG. The WHO described the development of the ICD-11 CDDG as "the most global, multilingual, multidisciplinary and participative revision process ever implemented for a classification of mental disorders", involving nearly 15,000 clinicians from 155 countries. As of April 2020, no release date of the ICD-11 CDDG has been given.

Personality disorder (PD)

- The personality disorder (PD) section has been completely revamped. All PDs have been merged into one: Personality disorder (6D10), which can be coded as Mild (6D10.0), Moderate (6D10.1), Severe (6D10.2), or severity unspecified (6D10.Z). There is also an additional category called Personality difficulty (QE50.7), which can be used to describe personality traits that are problematic, but do not rise to the level of a PD. Once a personality disorder or difficulty has been established, it may be specified by one or more Prominent personality traits or patterns (6D11). The ICD-11 uses five trait domains:

  (1) Negative affectivity (6D11.0);

  (2) Detachment (6D11.1),

  (3) Dissociality (6D11.2),

  (4) Disinhibition (6D11.3), and

  (5) Anankastia (6D11.4). Listed directly underneath is Borderline pattern (6D11.5), a category similar to Borderline personality disorder. This is not a trait in itself, but a combination of the five traits in certain severity.

- Described as a clinical equivalent to the Big Five model, [23] the five-trait system addresses several problems of the old category-based system. Of the ten PDs in the ICD-10, two were used with a disproportionate high frequency: Emotionally unstable personality disorder, borderline type (F60.3) and Dissocial (antisocial) personality disorder (F60.2). Many categories overlapped, and individuals with severe disorders often met the requirements for multiple PDs, which Reed et al. (2019) described as "artificial comorbidity". PD was therefore reconceptualized in terms of a general dimension of severity, focusing on five negative personality traits which a person can have to various degrees.
- There was considerable debate regarding this new dimensional model, with many believing that categorical diagnosing should not be abandoned. In particular, there was disagreement about the status of Borderline personality disorder. Reed (2018) wrote: "Some research suggests that borderline PD is not an independently valid category, but rather a heterogeneous marker for PD severity. Other researchers view borderline PD as a valid and distinct clinical entity, and claim that 50 years of research support the validity of the category. Many – though by no means all – clinicians appear to be aligned with the latter position. In the absence of more definitive data, there seemed to be little hope of accommodating these opposing views. However, the WHO took seriously the concerns being expressed that access to services for patients with borderline PD, which has increasingly been achieved in some countries based on arguments of treatment efficacy, might be seriously

undermined." Thus, the WHO believed the inclusion of a Borderline pattern category to be a "pragmatic compromise".

- The Alternative DSM-5 Model for Personality Disorders (AMPD) included near the end of the DSM-5 is similar to the PD-system of the ICD-11, although much larger and more comprehensive. It was considered for inclusion in the ICD-11, but the WHO decided against it because it was considered "too complicated for implementation in most clinical settings around the world", since an explicit aim of the WHO was to develop a simple and efficient method that could also be used in low-resource settings.

Gaming disorder

Gaming disorder (6C51) has been newly added to the ICD-11, and placed in the group "Disorders due to addictive behaviours", alongside Gambling disorder (6C50). The latter was called Pathological gambling (F63.0) in the ICD-10. Aside from Gaming disorder, the ICD-11 also features Hazardous gaming (QE22), an ancillary category that can be used to identify problematic gaming which does not rise to the level of a disorder.

Although a majority of scholars supported the inclusion of Gaming disorder (GD), a significant number did not. Aarseth et al. (2017) stated that the evidence base which this decision relied upon is of low quality, that the diagnostic criteria of gaming disorder are rooted in substance use and gambling disorder even though they are not the same, that no consensus exist on the definition and assessment of GD, and that a pre-defined category would lock research in a confirmatory approach. Rooij et al. (2017) questioned if what was called "gaming disorder" is in fact a coping strategy for underlying problems, such as depression, social anxiety, or ADHD. They also asserted moral panic, fueled by sensational media stories, and stated that the category could be stigmatizing people who are simply engaging in a very immersive hobby. Bean et al. (2017) wrote that the GD category caters to false stereotypes of gamers as physically unfit and socially awkward, and that most gamers have no problems balancing their expected social roles outside games with those inside.

In support of the GD category, Lee et al. (2017) agreed that there were major limitations of the existing research, but that this actually necessitates a standardized set of criteria, which would benefit studies more than self-developed instruments for evaluating problematic gaming. Saunders et al. (2017) argued that gaming addiction should be in the ICD-11 just as much as gambling addiction and substance addiction, citing functional neuroimaging studies which show similar brain regions being activated, and psychological studies which show similar antecedents (risk factors). Király and Demetrovics (2017) did not believe that a GD category would lock research into a confirmatory approach, noting that the ICD is regularly revised and characterized by permanent change. They wrote that moral panic around gamers does indeed exist, but that this is not caused by a formal diagnosis. Rumpf et al. (2018) noted that stigmatization is a risk not specific to GD alone. They agreed that GD could be a coping strategy for an underlying disorder, but that in this debate, "comorbidity is more often the rule than the exception". For example, a person can have an alcohol dependence due to PTSD. In clinical practice, both disorders need to be diagnosed and treated. Rumpf et al. also warned that the lack of a GD category might jeopardize insurance reimbursement of treatments.

The DSM-5 (2013) features a similar category called Internet Gaming Disorder (IGD). However, due to the controversy over its definition and inclusion, it is not included in its main body of mental diagnoses, but in the additional chapter "Conditions for Further Study". Disorders in this chapter are meant to encourage research and are not intended to be officially diagnosed.

Sexual health

- Conditions related to sexual health is a new chapter in the ICD-11. The WHO decided to put the sexual disorders in a separate chapter due to "the outdated mind/body split". A number of ICD-10 categories, including sex disorders, were based on a Cartesian separation of "organic" (physical) and "non-organic" (mental) conditions. As such, the sexual dysfunctions that were considered non-organic were included in the mental disorder chapter, while those that were considered organic were for the most part listed in the chapter on diseases of the genitourinary system. In the ICD-11, the brain and the body are seen as an integrate whole, with sexual dysfunctions considered to involve an interaction between physical and psychological factors. Thus, the organic/non-organic distinction was abolished.
- Regarding general sexual dysfunction, the ICD-10 has three main categories: Lack or loss of sexual desire (F52.0), Sexual aversion and lack of sexual enjoyment (F52.1), and Failure of genital response (F52.2). The ICD-11 replaces these with two main categories: Hypoactive sexual desire dysfunction (HA00) and Sexual arousal dysfunction (HA01). The latter has two subcategories: Female sexual arousal dysfunction (HA01.0) and Male erectile dysfunction (HA01.1). The difference between Hypoactive sexual desire dysfunction and Sexual arousal dysfunction is that in the former, there is a reduced or absent desire for sexual activity. In the latter, there is insufficient physical and emotional response to sexual activity, even though there still is a desire to engage in satisfying sex. The WHO acknowledged that there is an overlap between desire and arousal, but they are not the same. Management should focus on their distinct features.
- The ICD-10 contains the categories Vaginismus (N94.2), Nonorganic vaginismus (F52.5), Dyspareunia (N94.1), and Nonorganic dyspareunia (F52.6). As the WHO aimed to steer away from the aforementioned "outdated mind/body split", the organic and nonorganic disorders were merged. Vaginismus has been reclassified as Sexual pain penetration disorder (HA20). Dyspareunia (GA12) has been retained. A related condition is Vulvodynia, which is in the ICD-9 (625.7), but not in the ICD-10. It has been re-added to the ICD-11 (GA34.02).
- Excessive sexual drive (F52.7) from the ICD-10 has been reclassified as Compulsive sexual behaviour disorder (CSBD, 6C72) and listed under Impulse control disorders. The WHO was unwilling to overpathologize sexual behaviour, stating that having a high sexual drive is not necessarily a disorder, so long as these people do not exhibit impaired control over their behavior, significant distress, or impairment in functioning. Kraus et al. (2018) noted that several people self-identify as "sex addicts", but on closer examination do not actually exhibit the clinical characteristics of a sexual disorder, although they may have other mental health problems, such as anxiety or depression. Experiencing shame and guilt about sex is not a reliable indicator of a sex disorder, Kraus stated.
- There was debate on whether CSBD should be considered a (behavioral) addiction. It has been claimed that neuroimaging shows overlap between compulsive sexual behavior and substance-use disorder through common neurotransmitter systems. Nonetheless, it was ultimately decided to place the disorder in the Impulse control disorders group. Kraus et al. wrote that, for the ICD-11, "a relatively conservative position has been recommended, recognizing that we do not yet have definitive information on whether the processes involved in the development

and maintenance of the disorder [CSBD] are equivalent to those observed in substance use disorders, gambling and gaming".

- Paraphilic disorders, called Disorders of sexual preference in the ICD-10, have remained in the mental disorders chapter, although they have gray nodes in the sexual health chapter. The ICD-10 categories Fetishism (F65.0) and Fetishistic transvestism (F65.1) were removed because, if they don't cause distress or harm, they are not considered mental disorders.
- Transgenderism and gender dysphoria are called Gender incongruence in the ICD-11. In the ICD-10, the group Gender identity disorders (F64) consisted of three main categories: Transsexualism (F64.0), Dual-role transvestism (F64.1), and Gender identity disorder of childhood (F64.2). In the ICD-11, Dual-role transvestism was deleted due to a lack of public health or clinical relevance. Transsexualism was renamed Gender incongruence of adolescence or adulthood (HA60), and Gender identity disorder of childhood was renamed Gender incongruence of childhood (HA61).
- In the ICD-10, the Gender identity disorders were placed in the mental disorders chapter, following what was customary at the time. Throughout the 20th century, both the ICD and the DSM approached transgenderism from a psychopathological position, as transgenderism presents a discrepancy between someone's assigned sex and their gender identity. Since this causes mental distress, it was consequently considered a mental disorder, with distress or discomfort being a core diagnostic feature. In the 2000s and 2010s, this notion became increasingly challenged, as the idea of viewing transgenderism as a mental disorder was believed by some to be stigmatizing. It has been suggested that distress and dysfunction among transgender people should be more appropriately viewed as the result of social rejection, discrimination, and (sexual) violence toward individuals with gender variant appearance and behavior. Studies have shown transgender people to be at higher risk of developing mental health problems than other populations, but that health services aimed at transgender people are often insufficient or nonexistent. Since an official ICD code is usually needed to gain access and reimbursement for therapy, the WHO found it ill-advised to remove transgenderism from the ICD-11 all together. It was therefore decided to transpose the concept from the mental disorders chapter to the new sexual health chapter.

Traditional medicine

- "Supplementary Chapter Traditional Medicine Conditions - Module I" is an additional chapter in the ICD-11. It consists of concepts that are commonly referred to as Traditional Chinese Medicine (TCM), although the WHO prefers to use the more general and neutral sounding term Traditional Medicine (TM). Many of the traditional therapies and medicines that originally came from China also have long histories of usage and development in Japan (Kampo), Korea (TKM), and Vietnam (TVM). In fact, TM has been used all over the world for decades, if not centuries, and is an integral part of health services provided in many countries. A 2008 survey by the WHO found that "[i] n some Asian and African countries, 80% of the population depend on traditional medicine for primary health care". Also, "[i]n many developed countries, 70% to 80% of the population has used some form of alternative or complementary medicine (e.g. acupuncture)".
- From approximately 2003 to 2007, a group of experts from various countries developed the WHO International Standard Terminologies on Traditional Medicine in the Western Pacific Region, or simply IST. In the following years, based on this nomenclature, the group created the International Classification of Traditional Medicine, or ICTM. As of March 2020, Module I, also called TM1, is the only module of the ICTM to have been released. Morris, Gomes, & Allen (2012) have stated that Module II will cover Ayurveda, that Module III will cover homeopathy, and that Module IV will cover "other TM systems with independent diagnostic conditions in a similar fashion". However, these modules have yet to be made public, and Singh & Rastogi (2018) noted that this "keeps the speculations open for what actually is encompassing under the current domain [of the ICTM]".
- The decision to include T(C)M in the ICD-11 has been criticized, because it is often alleged to be pseudoscience. Editorials by Nature and Scientific American admitted that some TM techniques and herbs have shown effectiveness or potential, but that others are pointless, or even outright harmful. They wrote that the inclusion of the TM-chapter is at odds with the scientific, evidence-based methods usually employed by the WHO. Both editorials accused the government of China of pushing the WHO to incorporate TCM, a global, billion-dollar market in which China plays a leading role. The WHO has stated that the categories of TM1 "do not refer to – or endorse – any form of treatment", and that their inclusion is primarily intended for statistical purposes. The TM1 codes are recommended to be used in conjunction with the Western Medicine concepts of ICD-11 chapters 1-25.

Other notable changes in the ICD-11 include

- Stroke is now classified as a neurological disorder instead of a disease of the circulatory system.
- Allergies are now coded under diseases of the immune system.
- In the ICD-10, a distinction was made between Sleep disorders (G47), included in nervous system diseases chapter, and Nonorganic sleep disorders (F51), included in the mental disorders chapter. In the ICD-11, they are merged and placed into a new chapter called Sleep-wake disorders, since the separation between organic (physical) and non organic (mental) disorders is considered obsolete.
- "Supplementary section for functioning assessment" is an additional chapter that provides codes for use in the WHO Disability Assessment Schedule 2.0 (WHODAS 2.0), the Model Disability Survey (MDS), and the ICF.

DSM – 5

This is a manual related to psychiatric diseases. Its full form is Diagnostic and Statistica Manual of Mental disorders, 5th edition. This is update of 2013 to Diagnostic and Statistical Manual of Mental disorders, the taxonomic and diagnostic tool published by American Psychiatric Association (APA). In the United States, the DSM serves as the principal authority for psychiatric diagnoses. Treatment recommendations, as well as payment by health care providers are often determined by DSM classifications, so the appearance of a new version has significant practical importance. The DSM-5 is the first DSM to use an Arabic numeral in stead of a Roman numeral in its title as well as the first living document version of DSM.

In most respects, the DSM-5 is not greatly modified from the DSM-IV-TR; however, some significant differences exist between them. Notable changes in the DSM-5 include the reconceptualization of Asperger syndrome from a distinct disorder to an autism spectrum disorder; the elimination of subtypes of schizophrenia; the deletion of the "bereavement exclusion" for depressive disorders; the renaming of gender identity disorder to gender dysphoria, the inclusion of binge eating disorder as a discrete eating disorder; the renaming and reconceptualization of paraphilias, now called paraphilic disorders; the removal of the five-axis system; and the splitting of disorders not otherwise specified into other specified disorders and unspecified disorders.

- It is used by clinicians, researchers, psychiatric drug regulation agencies, health insurance companies, pharmaceutical companies, the legal system, and policymakers.
- The DSM evolved from systems for collecting census and psychiatric hospital statistics, as well as from a United States Army manual. Revisions since its first publication in 1952 have incrementally added to the total number of mental disorders, while removing those no longer considered to be mental disorders.
- Recent editions of the DSM have received praise for standardizing psychiatric diagnosis grounded in empirical evidence, as opposed to the theory-bound nosology used in DSM-III. However, it has also generated controversy and criticism, including ongoing questions concerning the reliability and validity of many diagnoses; the use of arbitrary dividing lines between mental illness and "normality"; possible cultural bias; and the medicalization of human distress.

Distinction from ICD

- An alternate, widely-used classification publication is the International Classification of Diseases (ICD) is produced by the World Health Organization (WHO).[6] The ICD has a broader scope than the DSM, covering overall health as well as mental health; chapter 5 of the ICD specifically covers mental and behavioural disorders. Moreover, while the DSM is the most popular diagnostic system for mental disorders in the US, the ICD is used more widely in Europe and other parts of the world, giving it a far larger reach than the DSM.
- The DSM-IV-TR (4th. ed.) contains specific codes allowing comparisons between the DSM and the ICD manuals, which may not systematically match because revisions are not simultaneously coordinated.[7] Though recent editions of the DSM and ICD have become more similar due to collaborative agreements, each one contains information absent from the other.[8]
- Mental health professionals use the manual to determine and help communicate a patient's diagnosis after an evaluation. Hospitals, clinics, and insurance companies in the United States may require a DSM diagnosis for all patients.[citation needed] Health-care researchers use the DSM to categorize patients for research purposes.
- An international survey of psychiatrists in sixty-six countries compared the use of the ICD-10 and DSM-IV. It found the former was more often used for clinical diagnosis while the latter was more valued for research.[9]
- DSM-5, and the abbreviations for all previous editions, are registered trademarks owned by the American Psychiatric Association.[2][10]

Earlier versions of DSM classification

DSM I - 1952

- An APA Committee, on Nomenclature and Statistics, was empowered to develop a version of Medical 203 specifically for use in the United States, to standardize the diverse and confused usage of different documents. In 1950, the APA committee undertook a review and consultation. It circulated an adaptation of Medical 203, the Standard's nomenclature, and the VA system's modifications of the Standard to approximately 10% of APA members: 46% of whom replied, with 93% approving the changes. After some further revisions (resulting in its being called DSM-I), the Diagnostic and Statistical Manual of Mental Disorders was approved in 1951 and published in 1952. The structure and conceptual framework were the same as in Medical 203, and many passages of text were identical. The manual was 130 pages long and listed 106 mental disorders. These included several categories of "personality disturbance", generally distinguished from "neurosis" (nervousness, egodystonic).
- In 1952, the APA listed homosexuality in the DSM as a sociopathic personality disturbance. Homosexuality: A Psychoanalytic Study of Male Homosexuals, a large-scale 1962 study of homosexuality by Irving Bieber and other authors, was used to justify inclusion of the disorder as a supposed pathological hidden fear of the opposite sex caused by traumatic parent–child relationships. This view was influential in the medical profession. In 1956, however, the psychologist Evelyn Hooker performed a study comparing the happiness and well-adjusted nature of self-identified homosexual men with heterosexual men and found no difference. Her study stunned the medical community and made her a heroine to many gay men and lesbians, but homosexuality remained in the DSM until May 1974.

DSM II - 1968

- In the 1960s, there were many challenges to the concept of mental illness itself. These challenges came from psychiatrists like Thomas Szasz, who argued mental illness was a myth used to disguise moral conflicts; from sociologists such as Erving Goffman, who said mental illness was another example of how society labels and controls non-conformists; from behavioural psychologists who challenged psychiatry's fundamental reliance on unobservable phenomena; and from gay rights activists who criticised the APA's listing of homosexuality as a mental disorder. A study published in Science, the Rosenhan experiment, received much publicity and was viewed as an attack on the efficacy of psychiatric diagnosis.
- The APA was closely involved in the next significant revision of the mental disorder section of the ICD (version 8 in 1968). It decided to go ahead with a revision of the DSM, which was published in 1968. DSM-II was similar to DSM-I, listed 182 disorders, and was 134 pages long. The term "reaction" was dropped, but the term "neurosis" was retained. Both the DSM-I and the DSM-II reflected the predominant psychodynamic psychiatry, although both manuals also included biological perspectives and concepts from Kraepelin's system of classification. Symptoms were not specified in detail for specific disorders. Many were seen as reflections of broad underlying conflicts or maladaptive reactions to life problems that were rooted in a distinction between neurosis and psychosis (roughly, anxiety/depression broadly in touch with reality, as opposed to hallucinations or delusions disconnected from reality). Sociological and biological knowledge was incorporated, under a model that did not emphasize a clear boundary between normality and abnormality. The idea that personality disorders did not involve emotional distress was discarded.
- An influential 1974 paper by Robert Spitzer and Joseph L. Fleiss demonstrated that the second edition of the DSM (DSM-II) was an unreliable diagnostic tool. Spitzer and Fleiss found that different practitioners using the DSM-II rarely agreed when diagnosing patients with similar problems. In reviewing previous studies of eighteen major diagnostic categories, Spitzer and Fleiss concluded that "there are no diagnostic categories for which reliability is uniformly high. Reliability appears to be only satisfactory for three categories: mental deficiency, organic brain syndrome (but not its subtypes), and alcoholism. The

level of reliability is no better than fair for psychosis and schizophrenia and is poor for the remaining categories".

DSM – III (1980)

⇨ In 1974, the decision to create a new revision of the DSM was made, and Robert Spitzer was selected as chairman of the task force. The initial impetus was to make the DSM nomenclature consistent with that of the International Classification of Diseases (ICD). The revision took on a far wider mandate under the influence and control of Spitzer and his chosen committee members. One added goal was to improve the uniformity and validity of psychiatric diagnosis in the wake of a number of critiques, including the famous Rosenhan experiment. There was also felt a need to standardize diagnostic practices within the United States and with other countries, after research showed that psychiatric diagnoses differed between Europe and the United States. The establishment of consistent criteria was an attempt to facilitate the pharmaceutical regulatory process.

⇨ The criteria adopted for many of the mental disorders were taken from the Research Diagnostic Criteria (RDC) and Feighner Criteria, which had just been developed by a group of research-orientated psychiatrists based primarily at Washington University in St. Louis and the New York State Psychiatric Institute. Other criteria, and potential new categories of disorder, were established by consensus during meetings of the committee chaired by Spitzer. A key aim was to base categorization on colloquial English (which would be easier to use by federal administrative offices), rather than by assumption of cause, although its categorical approach still assumed each particular pattern of symptoms in a category reflected a particular underlying pathology (an approach described as "neo-Kraepelinian"). The psychodynamic or physiologic view was abandoned, in favor of a regulatory or legislative model. A new "multiaxial" system attempted to yield a picture more amenable to a statistical population census, rather than a simple diagnosis. Spitzer argued "mental disorders are a subset of medical disorders", but the task force decided on this statement for the DSM: "Each of the mental disorders is conceptualized as a clinically significant behavioral or psychological syndrome." Personality disorders were placed on axis II along with mental retardation.

⇨ The first draft of DSM-III was ready within a year. It introduced many new categories of disorder, while deleting or changing others. A number of unpublished documents discussing and justifying the changes have recently come to light. Field trials sponsored by the U.S. National Institute of Mental Health (NIMH) were conducted between 1977 and 1979 to test the reliability of the new diagnoses. A controversy emerged regarding deletion of the concept of neurosis, a mainstream of psychoanalytic theory and therapy but seen as vague and unscientific by the DSM task force. Faced with enormous political opposition, DSM-III was in serious danger of not being approved by the APA Board of Trustees unless "neurosis" was included in some form; a political compromise reinserted the term in parentheses after the word "disorder" in some cases. Additionally, the diagnosis of ego-dystonic homosexuality replaced the DSM-II category of "sexual orientation disturbance".

⇨ Finally published in 1980, DSM-III listed 265 diagnostic categories and was 494 pages long. It rapidly came into widespread international use and has been termed a revolution, or transformation, in psychiatry.

DSM – III – R (1987)

⇨ In 1987, DSM-III-R was published as a revision of the DSM-III, under the direction of Spitzer. Categories were renamed and reorganized, with significant changes in criteria. Six categories were deleted while others were added. Controversial diagnoses, such as pre-menstrual dysphoric disorder and masochistic personality disorder, were considered and discarded. "Ego-dystonic homosexuality" was also removed and was largely subsumed under "sexual disorder not otherwise specified", which could include "persistent and marked distress about one's sexual orientation."

⇨ Altogether, the DSM-III-R contained 292 diagnoses and was 567 pages long. Further efforts were made for the diagnoses to be purely descriptive, although the introductory text stated for at least some disorders, "particularly the Personality Disorders, the criteria require much more inference on the part of the observer".

DSM – IV (1994)

⇨ In 1994, DSM-IV was published, listing 410 disorders in 886 pages. The task force was chaired by Allen Frances and was overseen by a steering committee of twenty-seven people, including four psychologists. The steering committee created thirteen work groups of five to sixteen members, each work group having about twenty advisers in addition. The work groups conducted a three-step process: first, each group conducted an extensive literature review of their diagnoses; then, they requested data from researchers, conducting analyses to determine which criteria required change, with instructions to be conservative; finally, they conducted multicenter field trials relating diagnoses to clinical practice.

⇨ A major change from previous versions was the inclusion of a clinical-significance criterion to almost half of all the categories, which required symptoms causing "clinically significant distress or impairment in social, occupational, or other important areas of functioning".

Some personality-disorder diagnoses were deleted or moved to the appendix.

DSM – IV – TR (2000):

⇨ A "text revision" of DSM-IV, known as DSM-IV-TR, was published in 2000. The diagnostic categories and the vast majority of the specific criteria for diagnosis were unchanged.[38] The text sections giving extra information on each diagnosis were updated, as were some of the diagnostic codes, to maintain consistency with the ICD. The DSM-IV-TR was organized into a five-part axial system. The first axis incorporated clinical disorders. The second axis covered personality disorders and intellectual disabilities. The remaining axes covered medical, psychosocial, environmental, and childhood factors functionally necessary to provide diagnostic criteria for health care assessments.

⇨ The DSM-IV-TR characterizes a mental disorder as "a clinically significant behavioral or psychological syndrome or pattern that occurs in an individual [which] is associated with present distress ... or disability ... or with a significant increased risk of suffering." It also notes "no definition adequately specifies precise boundaries for the concept of 'mental disorder' ... different situations call for different definitions." It states "there is no assumption that each category of mental disorder is a completely discrete entity with absolute boundaries dividing it from other mental disorders or from no mental disorder."

DSM – 5 (2013):

⇨ The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM), the DSM-5, was approved by the Board of Trustees of the APA on December 1, 2012. Published on May 18, 2013, the DSM-5 contains extensively revised diagnoses and, in some cases, broadens diagnostic definitions while narrowing definitions in other cases. The DSM-5 is the first major edition of the manual in 20 years.

- ⇨ A significant change in the fifth edition is the deletion of the subtypes of schizophrenia: paranoid, disorganized, catatonic, undifferentiated, and residual. The deletion of the subsets of autistic spectrum disorder—namely, Asperger's syndrome, classic autism, Rett syndrome, childhood disintegrative disorder and pervasive developmental disorder not otherwise specified—was also implemented, with specifiers regarding intensity: mild, moderate, and severe.
- ⇨ Severity is based on social communication impairments and restricted, repetitive patterns of behaviour, with three levels:
  1. Requiring support
  2. Requiring substantial support
  3. Requiring very substantial support

During the revision process, the APA website periodically listed several sections of the DSM-5 for review and discussion.

Future revisions and updates

- ⇨ Beginning with the fifth edition, it is intended that subsequent revisions will be added more often, to keep up with research in the field. It is notable that DSM-5 uses Arabic rather than Roman numerals. Beginning with DSM-5, the APA will use decimals to identify incremental updates (e.g., DSM-5.1, DSM-5.2) and whole numbers for new editions (e.g., DSM-5, DSM-6), similar to the scheme used for software versioning.

Chapter Resources

1. WHO website
2. Website materials

Key points of the chapter

Key points of the chapter:

- ⇨ ICD – 11 is the revision of International Classification of Diseases developed by 300 specialists from 55 countries which is divided into 30 groups, with an additional 10,000 proposals from people all over the world. This is officially endorsed by members of WHO in 25th May 2019.
- ⇨ The main purpose of ICD is to systematic recording, analysis, interpretation and comparison of mortality and morbidity data collected in different areas and at different times. It is also helpful in determining the health trends and statistics across the globe. This is the diagnostic classification for all clinical and research purposes.
- ⇨ ICD is useful in monitoring incidence and prevalence of diseases; observing the reimbursements and resource allocation trends; keeping track of safety and quality guidelines; counting of deaths and diseases, injuries, symptoms, reasons for encounter, factors that influence health status and external causes of disease.
- ⇨ Traditional medicine and gaming disorders are of special mention in ICD-11.
- ⇨ The term DSM refers to the Diagnostic and Statistical Manual for Mental Disorders is specifically used in categorizing psychiatric disorders. Five revisions of DSM has been taken place so far.

6

Concept of Samanyaja and Nanatmaja Vikara

Learning objectives

- ⇨ Meaning of Samanyaja and Nanatmaja Vikara
- ⇨ Difference between Samanyaja Vikara
- ⇨ Clinical application of Samanyaja and Nanatmaja Vikara

Meaning of Samanyaja Vikara

सामान्यजा इति वातादिभिः प्रत्येकं मिलितैश्च ये जन्यन्ते।
Cakra, Ca.Su. – 20/11

As per *Chakrapani*, in case of *Samanyaja Vikara*[1], dominance of *Dosha* may vary in different stages of the illness. We know that there are six stages of *Kriyakala* to understand any type of illness. One *Dosha* dominance will be observed in one or two stages of *Kriyakala*, other *Dosha* dominance will be observed in next one or two or three stages of *Kriyakala* and third *Dosha* may become dominant in rest of the stages of *Kriyakala*.

Meaning of Nanatmaja Vikara

नानात्मजा इति ये वातादिभिर्दोषान्तरा-संपृक्तैर्जन्यन्ते।
Cakra, Ca.Su. – 20/11

As per *Chakrapani*, in case of *Nanatmaja Vikara*[2], dominance of one *Dosha* will be definitely be observed through out the six stages of *Kriyakala*, there may be a possibility of association of one or two *Dosha* during the pathogenesis of the disease. But association of one *Dosha* from *Sanchaya* stage till *Bheda* stage of *Kriyakala* will be essentially be present.

Number of Samanyaja Vikara is 48 in number

रोगाणां तु सहस्रं यच्छतं विंशतिरेव च। Su.Ut. – 66/8

Total number of *Vikara* as per *Sushruta* is 1120.

Classification of diseases having 8 types:

इह खल्वष्टावुदराणि अष्टौ मूत्राघाताः अष्टौ क्षीरदोषाः अष्टौ रेतोदोषाः
Ca.Su. – 19/3

As per *Charaka*, there are 8 types of *Udara*, 8 types of *Mutraghata*, 8 types of *Kshiradosha* and 8 types of *Retodosha*.

8 types of Udara

इहखल्वष्टाबुदराणिअष्टौमूत्राघाताः अष्टौक्षीरदोषाः अष्टौरेतोदोषाः।
Ca.Su. – 19/3

8 types of *Udara – Vataja, Pittaja, Kaphaja, Sannipataja Udara, Plihodara* or *Yakritodara, Baddhodara, Chidrodara, Udakodara* or *Jalodara*

8 types of Mutraghata:

अष्टावुदराणीतिवातपित्तकफसांन्नपातप्लीहबद्धच्छिद्रा-दकोदराणीति॥
Ca.Su. – 19/3

GK

[1] Let us take the example of *Jvara*. *Pitta* is the main vitiating *Dosha* in the manifestation of *Jvara*. But, initially, in case of *Vataja Jvara*, the person may present with dryness of mouth, throat and palate and thirst, we can predict the vitiation of *Vata Dosha*, we have more stress on pacifying *Vata* and *Pitta Dosha*. Throughout the course of the illness, *Vata Dosha* will not be vitiated all the time

[2] In *Nanatmaja Vikara*, the person will be having the vitiation of one single *Dosha* throughout progression of the disease from onset till complete manifestation. There may be a possibility of association of other *Dosha* during the progression of the illness. Here we have to give stress on giving the treatment to one vitiated *Dosha*.

8 types of *Mutraghata – Vataja, Pittaja, Kaphaja, Sannipataja, Ashmarija, Sharkaraja, Shukraja, Shonitaja Mutraghata.*

8 types of Kshiradosha

अष्टौ मूत्राघाता इति-वातपित्तकफ सन्निपाताश्मरीशर्कराशुक्रशोणितनिमित्ता इति॥ Ca.Su. – 19/3

8 types of *Kshiradosha – Vaivarnya, Vaigandhya, Vairasya, Paicchilya, Phenasanghata, Raukshya, Gaurava, Atisneha*

8 types of Retodosha

अष्टौ रेतोदोषा इति- तनु शष्कं फेनिलमश्वेतं पूत्यतिपिच्छिलमन्यघातूपहितमवसादि चेति॥Ca.Su.–19/3

8 types of *Retodosha – Tanu, Shushka, Phenila, Ashveta, Puti, Atipicchila, Anya Dhatupahita, Avasadi*

Classification of diseases having 7 types

7 types of Kushtha

सप्त पिड़का इति-शराविका कच्छ पिका जालिनी सर्षप्यलजी विनता विद्रधि चेति Ca.Su. – 19/4

7 types of *Kushtha – Kapala, Udumbara, Mandala, Rishyajihva, Pundarika, Sidhma, Kakanaka*

7 types of Pidaka

सप्त पिड़का इति-शराविका कच्छ पिका जालिनी सर्षप्यलजी विनता विद्रधि चेति। Ca.Su. – 19/4

7 types of *Prameha Pidaka – Sharavika, Kacchapika, Jalini, Sarshapi, Alaji, Vinata* and *Vidradhi*

7 types of Visarpa

सप्त विसर्पा इति- वातपित्तकफाग्निकर्दमकग्रन्थिसन्निपाताख्याः॥
Ca.Su. – 19/4

7 types of *Visarpa – Vataja, Pittaja, Kaphaja, Sannipataja Visarpa, Agni Visarpa, Kardama Visarpa* and *Granthi Visarpa*

Classification based on 6 types

6 types of Atisara

षड़तीसारा इति - वातपित्तकफसन्निपातभय-शोकजाः।
Ca.Su. – 19/5

6 types of *Atisara – Vataja, Pittaja, Kaphaja, Sannipataja, Bhayaja* and *Shokaja*

6 types of Udavarta

षड्दावर्त्ता इति – वातमूत्रपुरीषशुक्रच्छर्दिक्ष-वथुजाः।
Ca.Su. – 19/5

6 types of *Udavarta – Vataja, Mutraja, Purishaja, Shukraja, Chardija, Kshavathuja*

Classification of diseases having 5 types

5 types of Gulma

पञ्च गुल्मा इति – वातपित्तकफसन्निपात-शोणितजाः।
Ca.Su. – 19/6

5 types of *Gulma – Vataja, Pittaja, Kaphaja, Sannipataja, Shonitaja*

पञ्च प्लीहदोपा- गुल्मैर्व्याख्याता भवन्ति।
Ca.Su. – 19/6

5 types of *Pliharoga – Vataja, Pittaja, Kaphaja, Sannipataja, Shonitaja*

5 types of Kasa

पञ्च कासा इति – वातपित्तकफक्षतक्षयजाः॥
Ca.Su. – 19/6

5 types of *Kasa – Vataja, Pittaja, Kaphaja, Kshataja* and *Kshayaja*

5 types of Shvasa

पञ्च श्वासा इति – महोर्द्धच्छिन्नतमकक्षुद्राः॥
Ca.Su. – 19/6

5 types of *Shvasa – Mahashvasa, Urdhvashvasa, Chinnashvasa, Tamaka Shvasa* and *Kshudra Shvasa*

5 types of Hikka

पञ्च हिक्का इति – महती गम्भीरा ध्यपेता क्षुद्रा चान्नजा च।
Ca.Su. – 19/6

5 types of *Hikka – Mahati, Gambhira, Vyapeta, Kshudra* and *Annaja Hikka*

5 types of Trishna

पञ्च तृष्णा इति - वात पित्तामक्षयोपसर्गात्मिकाः।
Ca.Su. – 19/6

5 types of *Trishna – Vataja, Pittaja, Amaja, Kshayaja* and *Upasargaja Trishna*

5 types of Chardi

पञ्च च्छद्रय इति – द्विष्टात्र संयोगवातपित्तकफसन्निपातोद्रं कात्मिकाः। Ca.Su. – 19/6

5 types of *Chardi* – *Vataja, Pittaja, Kaphaja, Sannipataja* and *Dvishtartha Samyogaja Chardi*

5 types of Arochaka

पञ्च भक्तस्यान शनस्थानानीति – वातपित्तकफद्वोषायासाः॥ Ca.Su. – 19/6

5 types of *Arochaka* – *Vataja, Pittaja, Kaphaja, Sannipataja, Ayasaja*

5 types of Shiroroga

पञ्च शिरोरोगा इति – पूर्व्वोद्दिशमभिसमस्य वातपित्तकफसन्निपातक्रिमिजाः॥ Ca.Su. – 19/6

5 types of *Shiroroga* – *Vataja, Pittaja, Kaphaja, Sannipataja* and *Krimija*

5 types of Hridroga

पञ्च हृद्रोगा इति – शिरोरोगैर्व्याख्याताः। Ca.Su.–19/6

5 types of *Hridroga*– *Vataja, Pittaja, Kaphaja, Sannipataja* and *Krimija*

5 types of Pandu

पञ्च पाण्डुरोगा इति – वातपित्तकफसन्नि-पातमृज्जाः। Ca.Su. – 19/6

5 types of *Pandu* – *Vataja, Pittaja, Kaphaja, Sannipataja* and *Mrid Bhakshanajanya*

पञ्चोन्मादा इति – वातपित्तकफसन्निपाता-गन्तुनिमित्ताः॥ Ca.Su. – 19/6

5 types of *Unmada* – *Vataja, Pittaja, Kaphaja, Sannipataja* and *Agantuja*

Classification of diseases having 4 types

चत्वारोऽपस्मारा इति – वातपित्तकफसन्निपातनिमित्ताः॥
चत्वारोऽक्षिरोगाश्चत्वारश्च कर्णरोगाश्चत्वारः प्रतिश्याया चत्वारो मुखरोगाश्चत्वारो ग्रहणीदोषाश्चत्वारो मदाश्चत्वारो मूर्च्छाया इत्यपस्मारैर्व्याख्याताः।
चत्वारः शोषा इति साहसन्धारणक्षयविषमाशनजाः।
चत्वारि क्लव्यानीति – बीजोपघातात् ध्वजभङ्गज्जरायाः शुक्रक्षयाच्च॥7॥

- Types of *Apasmara*: *Vataja, Pittaja, Kaphaja, Sannipataja*
- Types of *Netraroga*– *Vataja, Pittaja, Kaphaja* and *Sannipataja*
- Types of *Karnaroga*– *Vataja, Pittaja, Kaphaja* and *Sannipataja*
- Types of *Pratishyaya*– *Vataja, Pittaja, Kaphaja* and *Sannipataja*
- Types of *Mukharoga*– *Vataja, Pittaja, Kaphaja* and *Sannipataja*
- Types of *Grahani*– *Vataja, Pittaja, Kaphaja* and *Sannipataja*
- Types of *Murcha*– *Vataja, Pittaja, Kaphaja* and *Sannipataja*
- Types of *Shosha*– *Sahasajanya, Vegadharanajanya, Kshayajanya* and *Vishamashanajanya*
- Types of *Klaibya*– *Bijopaghata, Dhvajabhanga, Jarajanya, Shukrakshayajanya*

Classification of diseases having 3 types

तयः शोथा इति – वातपित्तश्लेष्मनिमित्ताः।
त्रीणि किलासानीति रक्तताम्रशुक्लानि।
त्रिविधंलोहितपित्तमितिउर्द्ध्वभागमधोभागमुभयभागश्च॥8॥
Ca.Su. – 19/8

3 types of *Shotha* – *Vataja, Pittaja, Kaphaja*
3 types of *Kilasa* – *Rakta, Tamra* and *Shukla*
3 types of *Raktapitta* – *Urdhvabhagaa, Adhobhaga, Ubhayabhaga*

Classification of diseases having 2 types

द्वौ ज्वरावित्युष्णाभिप्रायः शीतसमुत्थः, शीताभिप्राय-श्चोष्णा समुत्थः॥
द्वौ व्रणाविति-निज आगन्तुश्च।
द्वावायामौ इति – बाह्यश्चाभ्यन्तरश्चेति।
द्वे गृधस्याविति – वाताद् वातकफाच्च।
द्वे कामले इति – कोष्ठाश्रया शखाश्रया च।
द्विविधमाममित्यलसको विसूचिका च।
द्विविधं वातशोणितमित्युत्तानं गम्भीरश्च।
द्विविधान्यर्शांसीतिशुष्कणयार्द्राणि च॥ Ca.Su. – 19/9

2 types of *Jvara* – *Shita Samuttha* and *Ushna Samuttha*
2 types of *Vrana* – *Nija* and *Agantuja*
2 types of *Ayama* – *Bahya* and *Abhyantara*
2 types of *Gridhrasi* – *Vataja* and *Vatakaphaja*
2 types of *Kamala* – *Koshthashraya* and *Shakhashraya*
2 types of *Ama* – *Alasaka* and *Visuchika*
2 types of *Vatashonita* – *Uttana* and *Gambhira*
2 types of *Arshas* – *Shushka* and Ardra

Classification of diseases having 1 type

एक ऊरुस्तम्भ इत्यामत्रिदोषसमुत्थः।
एकः संन्यास इति – त्रिदोषात्मको मनः शरीराधिष्ठान इति।
एको महागद इत्यतत्त्वाभिनिवेशः॥10॥ Ca.Su. – 19/10

1 type – *Urustambha* and it is due to the dominance of *Tridosha*
1 type – *Sanyasa,* this is dominant and involving *Sharira* and *Manas Adhishthana*
1 type – *Atatvabhinivesha*

Classification of diseases having 20 types

20 types of Krimi

विंशतिः क्रिमिजातय इति – यूकाः पिपीलिकाश्च द्विविधा बहिर्मलजाः।
केशाद्वा लोमादा लोमद्वीपाः सौरसा औडुम्बरा जन्तुमातश्चेति षट् शोणितजाः।
अन्त्रादा उदरावेष्टा हृदयचराश्चुरवो दर्भपुष्पाः सौगन्धिका महागुदाश्चेति सप्त कफजाः।
ककेरुकाका मकेरुका लेलिहाः सशूलसौसुरादाश्चेति पञ्च पुरीषजा इति॥11॥ Ca.Su. – 19/11

- ***Bahirmalaja Krimi*** – 2, *Yuka* and *Pipilika*
- ***Shonitaja Krimi*** – 6, *Keshada, Lomada, Lomadvipa, Saurasa, Audumbara, Jantumatara*
- ***Kaphaja Krimi*** – 7, *Antrada, Udaraveshta, Hrdayachara, Churu, Darbhapushpa, Saugandhika, Mahaguda*
- ***Purishaja Krimi*** – 5, *Kakeruka, Makeruka, Leliha, Sashula, Sausurada*

20 types of Prameha:

विंशतिः प्रमेहा इति – उदकमेहश्चेक्षुवालिकारसमेहश्च सान्द्रमेहश्च सान्द्रप्रसादमेहश्च शुक्लमेहश्च शुक्रमेहश्च शीतमेहश्च शनैर्मेहश्च सिकतामेहश्च लालामेहश्चेति दश श्लेष्मनिमित्ताः।
क्षारमेहश्च कालमेहश्च नीलमेहश्च लोहितमेहश्च मञ्जिष्ठामेहश्च हरिद्रामेहश्चेति षट् पित्तनिमित्ताः।
वसामेहश्च मज्जमेहश्च हस्तिमेहश्च मधुमेहश्चेति चत्वारो वातनिमित्तः।
इति विंशतिर्मेहाः॥12॥ Ca.Su. – 19/12

- ***Kaphaja Prameha***– 10, *Udakameha, Ikshuvalikarasa Meha, Sandrameha, Sandraprasadameha, Shuklameha, Shukrameha, Shitameha, Shanairmeha, Sikatameha, Lalameha*
- ***Pittaja Prameha***– 6, *Ksharameha, Kalameha, Nilameha, Lohitameha, Manjishthameha, Haridrameha*
- ***Vataja Prameha***– 4, *Vasameha, Majjameha, Hastimeha, Madhumeha*

20 types of Yonivyapat

विंशतिर्योनिव्यापद इति – वातिकी पैत्तिकी श्लैष्मिकी सान्निपातिकी चेति चतस्रो दोपजाः।
दोषदूष्यसंसर्गप्रकृतिनिर्देशैरवशिष्टाः षोडश निद्दिश्यन्ते।
रक्तयोनिश्चारजस्का चाचरणा चातिचरणा च प्राक चरणा चोपप्लुता च परिप्लुता चोदावर्त्तिनी च कर्णिनी च पुत्रघ्नी चान्तर्मुखी च सूचीमुखी च शुष्का च वामिनी च षण्डयोनिश्च महायोनिश्चेति विंशतिर्योनिव्यापदो भवन्ति।
इतिकेवलश्चामुद्देशो यथोद्देशमभिनिर्दिष्टो भवति॥13॥

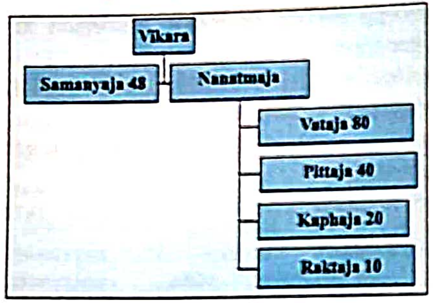
20 types of *Yonivyapat* – *Vatiki, Paittiki, Shlaishmiki, Sannipatiki* – 4 *Dosha* dominant

16 are specific *Yonivyapat* – *Raktayoni, Arajaska, Acharana, Aticharana, Prakcharana, Upapluta, Paripluta, Udavartini, Karnini, Putraghni, Antarmukhi, Suchimukhi, Shushka, Vamini, Shandhi, Mahayoni*

Number of Nanatmaja Vikara:

- *Vataja Nanatmaja Vikara* – 80
- *Pittaja Nanatmaja Vikara* – 40
- *Kaphaja Nanatmaja Vikara* – 20

⇨ *Raktaja Nanatmaja Vikara* – 10 (as per *Sharangadhara*)



Flowchart 6.1: showing classification of Samanyaja and Nanatmaja Vikara

तत्रादौ वातविकाराननुव्याख्यास्यामः।
तद्ययानखभेदश्च, विपादिका च, पादशूलं च, पादभ्रंशश्च, पादसुप्तता च, वातखुड्डता च, गुल्फग्रहश्च, पिण्डिकोद्वेष्टनं च, गृध्रसी च, जानुभेदश्च, जानुविश्लेषश्च, ऊरुस्तम्भश्च, ऊरुसादश्च, पाङ्गुल्यं च, गुदभ्रंशश्च, गुदार्तिश्च, वृषणाक्षेपश्च, शेफस्तम्भश्च, वङ्क्षणानाहश्च, श्रोणिभेदश्च, विड्भेदश्च, उदावर्तश्च, खञ्जत्वं च, कुब्जत्वं च, वामनत्वं च, त्रिकग्रहश्च, पृष्ठग्रहश्च, पार्श्वावमर्दश्च, उदरावेष्टश्च, हृन्मोहश्च, हृद्द्रवश्च, वक्षउद्धर्षश्च, वक्षउपरोधश्च, वक्षस्तोदश्च, बाहुशोषश्च, ग्रीवास्तम्भश्च, मन्यास्तम्भश्च, कण्ठोद्ध्वंसश्च, हनुभेदश्च, ओष्ठभेदश्च, अक्षिभेदश्च, दन्तभेदश्च, दन्तशैथिल्यं च, मूकत्वं च, वाक्सङ्गश्च, कषायास्यता च, मुखशोषश्च, अरसज्ञता च, घ्राणनाशश्च, कर्णशूलं च, अशब्दश्रवणं च, उच्चैःश्रुतिश्च, बाधिर्यंच, वर्त्मस्तम्भश्च, वर्त्मसङ्कोचश्च, तिमिरं च, अक्षिशूलं च, अक्षिव्युदासश्च, भ्रूव्युदासश्च, शङ्खभेदश्च, ललाटभेदश्च, शिरोरुक् च, केशभूमिस्फुटनं च, अर्दितं, च एकाङ्गरोगश्च, सर्वाङ्गरोगश्च, पक्षवधश्च, आक्षेपकश्च, दण्डकश्च, तमश्च, भ्रमश्च, वेपथुश्च, जृम्भा च, हिक्का च विषादश्च, अतिप्रलापश्च, रौक्ष्यंच, पारुष्यं च, श्यावारुणावभासता च, अस्वप्नश्च, अनवस्थितचित्त्वं च; इत्यशीतिर्वातविकारा वातविकाराणामपरिसंख्येयानामाविष्कृततमा व्याख्याताः॥11॥ Ca.Su. – 20/11

1. *Nakha Bheda* (cracking of the nails)
2. *Vipadika* (cracking of the soles)
3. *Pada Shula* (pain in the foot)
4. *Pada Bhramsha* (foot drop)
5. *Pada Suptata* (numbness of the foot or loss of functions of the foot)
6. *Vata Khuddata* वातखुड्डता 'चालुक' इति प्रसिद्धः। *Cakra*, Ca.Su. – 20/10 (pain in the ankle region)
7. *Gulpha Graha* (stiffness of ankle region)
8. *Pindika Udveshtana* (muscle cramps in calf region)
9. *Gridhrasi* (sciatica syndrome)
10. *Janubheda* (tearing type of pain in knee joint)
11. *Janu Vishlesha* (Dislocation in the knee joint)
12. *Urustambha* (stiffness in thigh region)
13. *Urusada* (loss of movement or sluggish movement of thighs)
14. *Pangulya* (paraplegia or loss of movement of both lower limbs)
15. *Guda Bhramsha* (prolapse of rectum)
16. *Gudarti* (pain in the anal region)
17. *Vrishanakshepa* (pain in scrotal region)
18. *Shepha Stambha* (stiffness in penis)
19. *Vamkshana Anaha* (distension or fullness of groin region)
20. *Shronibheda* (tearing type of pain in the pelvic region)
21. *Vid Bheda* (unformed stools)
22. *Udavarta* (reverse peristaltic movement)
23. *Khanjata* (limping)
24. *Kubjata* (kyphosis)
25. *Vamanatva* (dwarfism)
26. *Trikagraha* (stiffness of sacral region)
27. *Prishtha Graha* (stiffness of back)
28. *Parshva Avamarda* (compression of squeezing type of pain in sides of the chest)
29. *Udaraveshta* (twisting type of pain in the abdomen)
30. *Hrinmoha* (cardiac dysfunction)
31. *Hrid drava* (tachycardia or palpitation)

32. *Vaksha Uddharsha* (rubbing type of pain in the chest)
33. *Vaksha Uparodha* (constriction in the chest)
34. *Vaksha Toda* (pricking type of pain in the chest)
35. *Bahu Shosha* (dryness or atrophy of muscles of the upper limb)
36. *Griva Stambha* (stiffness of neck)
37. *Manya stambha* (stiffness of nape of neck or torticollis)
38. *Kantha Uddhvamsa* (hoarseness of voice)
39. *Hanu Bheda* (tearing type of pain in jaw)
40. *Oshtha Bheda* (tearing type of pain in lips)
41. *Akshi Bheda* (tearing type of pain the eyes)
42. *Danta Bheda* (tearing type of pain in the teeth)
43. *Danta Shaithilya* (loose teeth)
44. *Mukatva* (aphasia, a clinical condition where the patient is not in a position to speak)
45. *Vaksanga* (stammering speech or stuttering)
46. *Kashayasyata* (astringent taste in the mouth)
47. *Mukha Shosha* (dryness of the mouth)
48. *Arasajnata* (loss of taste perception)
49. *Ghrana Nasha* (loss of smell perception)
50. *Karna Shula* (pain in the ears)
51. *Ashabda Shravana* (tinnitus)
52. *Ucchai Shruti* (the person can hear only loud voice)
53. *Badhirya* (deafness)
54. *Vartma Stambha* (stiffness of the eye lids)
55. *Vartma Sankocha* (entropion)
56. *Timira* (loss of vision)
57. *Akshi Shula* (pain in the eyes)
58. *Akshi Vyudasa* (squint eyes)
59. *Bhru Vyudasa* (twisting in the eyes)
60. *Shankha Bheda* (tearing type of pain in the temporal region)
61. *Lalata Bheda* (tearing type of pain in the frontal region)
62. *Shiro ruk* (headache)
63. *Kesha Bhumi Sphutana* (cracking of the scalp region)
64. *Ardita* (facial paralysis)
65. *Ekanga Roga* (monoplegia)
66. *Sarvanga Roga* (quadriplegia)
67. *Paksha Vadha* (hemiplegia)
68. *Akshepaka* (clonic convulsions)
69. *Dandaka* (tonic convulsions)
70. *Tama* (feeling of darkness in front of the eyes)
71. *Bhrama* (giddiness)
72. *Vepathu* (tremors or involuntary movements)
73. *Jrimbha* (yawning)
74. *Hikka* (hiccup)
75. *Vishada* (depression)
76. *Ati Pralapa* (excess incomprehensible speech)
77. *Raukshya* (dryness)
78. *Parushya* (roughness)
79. *Shyava Aruna Bhasata* (blackish or reddish discolouration)
80. *Asvapna* (sleeplessness)
81. *Anavasthita Chittatva* (unstable mind)

Pittaja Nanatmaja Vikara

पित्तविकारांश्चत्वारिंशतमत ऊर्ध्वमनुव्याख्यास्यामः- ओषश्च, प्लोषश्च, दाहश्च, दवथुश्च, धूमकश्च, अम्लकश्च, विदाहश्च, अन्तर्दाहश्च, अंसदाहश्च, ऊष्माधिक्यं च, अतिस्वेदश्च (अङ्गस्वेदश्च), अङ्गगन्धश्च, अङ्गावदरणं च, शोणितक्लेदश्च, मांसक्लेदश्च, त्वग्दाहश्च (मांसदाहश्च), त्वगवदरणं च, चर्मदलनं च, रक्तकोठश्च, रक्तविस्फोटश्च, रक्तपित्तं च, रक्तमण्डलानि च, हरितत्वं च, हारिद्रत्वं च, नीलिका च, कक्षा (क्ष्या) च, कामला च, तिक्तास्यता च, लोहितगन्धास्यता च, पूतिमुखता च, तृष्णाधिक्यं च, अतृप्तिश्च, आस्यविपाकश्च, गलपाकश्च, अक्षिपाकश्च, गुदपाकश्च, मेढ्रपाकश्च, जीवादानं च, तमःप्रवेशश्च, हरितहारिद्रनेत्रमूत्रवर्चस्त्वं च; इति चत्वारिंशत्पित्तविकाराः

पित्तविकाराणामपरिसंख्येयानामाविष्कृततमाव्याख्याताः॥१४॥ Ca.Su. – 20/14

1. *Osha* ओषः पार्श्वस्थितेनेव वह्निना पीडा। (burning sensation in the sides of the chest)
2. *Plosha* प्लेषः किंचिद्दहनमिव। (slight burning sensation in any part of the body)
3. *Daha* दाहः सर्वाङ्गदहनमिव (burning sensation in all over the body)
4. *Davathu* दवथुः 'धकधकिका' इति लोके ख्याता। (intense heat in one part or all over the body)
5. *Dhumaka* धूमकः धूमोद्वमनमिव। (sensation of smoke coming out through mouth)
6. *Amlaka* (sour eructation)
7. *Vidaha* (burning sensation in alimentary canal)
8. *Antardaha* (burning sensation inside the body)
9. *Amsadaha* (burning sensation in arm)
10. *Ushmadhikya* (raised body temperature)
11. *Atisveda* (excess sweating)
12. *Angagandha* (foul smell from the body)
13. *Angavidarana* (tearing of the body parts)
14. *Shonita Kleda* (increased moisture in the blood)
15. *Mamsa Kleda* (increased moisture in the muscles)
16. *Tvak Daha* (burning sensation in the skin)
17. *Tvak Avadarana* (cracking of the skin)
18. *Charma Dalana* (thickness of the skin)
19. *Rakta Kotha* (urticarial rashes)
20. *Rakta Visphota* (pustules)
21. *Rakta Pitta* (bleeding disorders)
22. *Rakta Mandala* (haemorrhagic rounded patches)
23. *Haritatva* (greenish discolouration)
24. *Haridratva* (yellowish discolouration)
25. *Nilika* (blue moles)
26. *Kaksha* (herpes infection in axilla)
27. *Kamala* (jaundice)
28. *Tiktasyata* (bitter taste in the mouth)
29. *Lohita Gandhasyata* (smell of blood in the oral cavity)
30. *Putimukhata* (foetid smell from the oral cavity)
31. *Trishnadhikya* (excess thirst)
32. *Atripti* (loss of contentment)
33. *Asyapaka* (inflammation of oral cavity or stomatitis)
34. *Galapaka* (inflammation of throat)
35. *Akshipaka* (inflammation of the eyes)
36. *Gudapaka* (inflammation of the anal region)
37. *Medhrapaka* (inflammation in penis)
38. *Jivadana* (passage of fresh blood from the body to the exterior)
39. *Tama pravesha* (darkness in front of the eyes)
40. *Harita haridra netra mutra* and *varchas* (greenish or yellowish discolouration of the eyes, urine and faecal matter)

Kaphaja Nanatmaja Vikara

श्लेष्मविकारांश्च विंशतिमत ऊर्ध्वं व्याख्यास्यामः तद्यथा-तृप्तिश्च, तन्द्रा च, निद्राधिक्यं च, स्तैमित्यं च, गुरुगात्रता च, आलस्यं च, मुखमाधुर्यं च, मुखस्रावश्च, श्लेष्मोद्गिरणं च, मलस्याधिक्यं च, बलसकश्च, अपक्तिश्च, हृदयोपलेपश्च, कण्ठोपलेपश्च, मधनीप्रति (वि) चयश्च, गलगण्डश्च, अतिस्थौल्यं च, शीताग्निता च, उदर्दश्च श्वेतामभासता च, श्वेतमूत्रनेत्रवर्चस्त्वं च; इति विंशतिः श्लेष्मविकाराः श्लेष्मविकाराणामपरिसंख्येयानामाविष्कृततमा व्याख्याता भवन्ति॥१७॥ Ca.Su. – 20/17

1. *Tripti* (anorexia or aversion to take food)
2. *Tandra* (drousiness)
3. *Nidradhikya* (excessive sleep)
4. *Staimitya* (sensation of the covering of wet cloth all over the body)
5. *Guru Gatrata* (heaviness of the body parts)
6. *Alasya* (laziness or lassitude)
7. *Mukha Madhurya* (sweet taste in the mouth)
8. *Mukha srava* (excess salivation)

9. *Shleshma Udgirana* (excess expectoration of sputum)
10. *Maladhikya* (excess formation and accumulation of waste products in the body)
11. *Balasaka* बलासकः बलक्षयः; श्लेष्मोद्रेकान्मन्दज्वरित्वं, स्थूलाङ्गता वा बलासकः।
    - ⇨ Loss of strength
    - ⇨ Low grade of fever due to the dominance of *Kapha Dosha*
    - ⇨ Stout body parts
12. *Apakti* (indigestion)
13. *Hridaya Upalepa* (adherence of waste products in heart region)
14. *Kantha Upalepa* (accumulation of waste products in the throat)
15. *Dhamani Pratichaya* (accumulation of waste products in the *Dhamani*)
16. *Galaganda* (goitre)
17. *Ati Sthaulya* (hyper obesity)
18. *Shitagnita* (low digestive fire)
19. *Udarda* (urticarial rashes)
20. *Shvatavabhasata* (pale look or whitish appearance)
21. *Shveta mutra*, netra and varchas (whitish discolouration of urine, eyes and faecal matter)

Raktaja Nanatmaja Vikara

रक्तस्य च दश प्रोक्ता व्याधयस्तेषु गौरवम्॥
रक्तमण्डलता रक्तनेत्रत्वं रक्तमूत्रता।
रक्तष्ठीवनं रक्तपिडकानां च दर्शनम्।
औष्ण्यं च पूतिगन्धत्वं पीडा पाकश्च जायते॥
Sha.Pu. – 7/125-127

1. *Gaurava* (heaviness of the body parts)
2. *Rakta Mandalata* (red circular patches)
3. *Rakta Netrata* (reddish discolouration of the eyes)
4. *Rakta Mutrata* (reddish discolouration of the urine)
5. *Rakta Nishthivana* (reddish discolouration of sputum)
6. *Rakta Pidaka Darshana* (appearance of red boils)
7. *Aushnya* (raised body temperature)
8. *Putigandhata* (foul smell from the body)
9. *Pida* (pain or discomfort)
10. *Paka* (inflammation in any part of the body)

Nidanarthakara Roga

Definition of Nidanarthakara Roga:

निदानार्थकरो रोगो रोगस्याप्युपलभ्यते॥१६॥
Ca.Ni. – 8/16

The term '*Nidanarthakara Roga*' refers to one disease will become the etiological factor for another disease and secondary disease will become the etiological factor for tertiary disease. In this regard, several questions can be asked such as the difference between *Upadrava*[3] and *Nidanarthakara Roga*; difference between *Anubandha*[4] and *Nidanarthakara Roga*. As far as concepts of these terms are concerned, there is no difference between *Nidanarthakara Roga*, *Upadrava* and *Anubandha*.

Examples given for Nidanarthakara Vyadhi:

तद्यथा-ज्वरसंतापाद्रक्तपित्तमुदीर्यते।
रक्तपित्ताज्ज्वरस्ताभ्यां शोषश्चाप्युपजायते॥१७॥
प्लीहाभिवृद्ध्या जठरं जङ्गराच्छोथ एव च।
अर्शोभ्यो जठरं दुःखं गुल्मश्चाप्युपजायते॥१८॥
प्रतिश्यायाद्भवेत् कासः कासात् संजायते क्षयः।
क्षयो रोगस्य हेतुत्वे शोषस्याप्युपलभ्यते॥१९॥
Ca.Ni. – 8/17-19

⇨ The manifestation of *Jvara* (fever) in an

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[3] The description of *Upadrava* is described in the context of subheading of *Upadrava* and *Udarka* in the main heading of *Nidana Panchaka* context.

[4] The description of *Anubandha* is explained in the context of classification of *Vyadhi* while describing *Anubandhya* and *Anubandha Vikara* in the context of *Vyadhi Vigyana*.

individual will become the cause for the manifestation of *Raktapitta* (bleeding disorders)[5].

- ⇨ The manifestation of *Raktapitta* (bleeding disorders) in an individual will become the cause for the manifestation of *Jvara* (fever) which further becomes the etiological factor for the manifestation of *Shosha* (excess emaciation).
- ⇨ The occurrence of *Pliha Vriddhi* (enlargement of spleen) will become the causative factor for the manifestation of *Jathara Dukha* (disturbance of alimentary canal) which further leads to the manifestation of *Shotha* (localised or generalised swelling).
- ⇨ The appearance of *Arshas* (haemorrhoids) in an individual will further lead to the manifestation of *Jathara Dukha* (disturbance of alimentary canal) and further resulting the manifestation of *Gulma* (chronic abdominal swelling)[6].
- ⇨ The presence of *Pratishyaya* (rhinorrhoea) in an individual will be responsible for the manifestation of *Kasa* (cough), further resulting in the manifestation of *Kshaya* (tuberculosis), if untreated will be responsible for the manifestation of *Shosha* (excess emaciation)[7].

Types of Nidanarthakara Roga

थे पूर्वे केवला रोगाः पश्चाद्धेत्वर्थकारिणः।
उभयार्थकरा दृष्टास्तथैवैकार्थकारिणः॥2 0॥ Ca.Ni. – 8/20

2 types

1. *Ekarthakari*: the term *'Ekarthakari'* refers to the manifestation of the secondary disease with the disappearance of primary disease.
2. *Ubhayarthakari*: the term *'Ubhayar-thakari'* refers to the appearance of the secondary disease along with the persistence of primary disease.

Hetu Sankara

The term *Hetu Sankara* comprises of two words. *Hetu* means the cause or etiological factor and *Sankara* refers to the group.

एको हेतुरनेकस्य तथैकस्यैक एव हि।
व्याधेरेकस्य चानेको बहूनां वहवोऽपि च॥2 4॥
ज्वरभ्रमप्रलापाद्या दृश्यन्ते रूक्षहेतुजाः।
रूक्षेणैकेन चाप्येको ज्वर एवोपजायते॥2 5॥
हेतुभिर्बहुभिश्चैको ज्वरो रूक्षादिभिर्भवेत्।
रूक्षादिभिर्ज्वराद्याश्च व्याधयः संभवन्ति हि॥2 6॥।

Ca.Ni. – 8/24-26

- ⇨ Single etiological factor will be responsible for the occurrence of multiple diseases. *Jvara* (fever), *Bhrama* (giddiness) and *Pralapa* (irrelevant and incomprehensible speech) etc are manifested due to the exposure to *Ruksha* (dry) substances.
- ⇨ Single etiological factor will be responsible for the manifestation of single disease. *Jvara* (fever) will be manifested in an individual due to the exposure to *Ruksha* substances.
- ⇨ Multiple etiological factors will be responsible for the occurrence of single disease. *Ruksha* (dry), *Laghu* (light to digest) and *Lavana* (salt) etc etiological factors are responsible for the manifestation of *Jvara*.
- ⇨ Multiple etiological factors will be responsible for the manifestation of multiple diseases. *Ruksha* etc etiological factors are responsible for the occurrence of *Jvara* (raised body temperature), *Raktapitta* (bleeding disorders) and *Gulma* (chronic abdominal swellings).

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[5] In these two diseases, the connecting link between two diseases *Jvara* and *Raktapitta* is vitiated *Pitta Dosha*. Similarly, one has to try to identify the connecting links between two diseases a person may suffer from.

[6] In this group of diseases, *Arshas*, *Jathara Dukha* and *Gulma*, the connecting link between these diseases is *Mahasrotas* (alimentary canal).

[7] In this group of diseases *Pratishyaya*, *Kasa*, *Kshaya* and *Shosha*, the connecting link between these diseases is *Pranavaha Srotas*

Linga Sankara

The term ***Linga Sankara*** **comprises two words–** *Linga* (*Lakshana*) and *Sankara*. The term *Linga* refers to clinical feature and *Sankara* refers to the group.

लिङ्ग चैकमनेकस्य तथैवैकस्य लक्ष्यते।
बहून्येकस्य च व्याधेर्बहूनां स्युर्बहूनि च॥2 7॥
विषमारम्भमूलानां लिङ्गमेकं ज्वरो मतः।
जस्यैकस्य पाप्येकः संतोपा लिङ्गमुच्यते॥2 8॥
विषमारम्भमूलैश्च ज्वर एको निरुच्यते।
लिङ्गैरेतैर्ज्वरश्वासहिक्काद्याः सन्ति चामयाः॥2 9॥

Ca.Ni. – 8/27-29

- ⇨ One symptom may be common to many diseases, e.g. *Jvara* may be the common symptom of many diseases having irregularity in onset
- ⇨ One symptom may be related to only one disease. E.g. hyperpyrexia is the only symptom of *Jvara* alone.
- ⇨ Multiple symptoms may be seen in single disease. E.g. many symptoms such as irregularity in onset may be related to *Jvara* alone
- ⇨ Multiple symptoms may be present in multiple diseases. E.g. many symptoms like irregularity in onset *Jvara*, *Shvasa* and *Hikka* etc can be observed

Vyadhi Sankara

The term *Vyadhi Sankara* **comprises two words** – *Vyadhi* and *Sankara*. The term *Vyadhi* refers to disease and Sankara refers to group.

Cakra, Ca.Ni. – 8/22. As per *Cakrapani*, the *Vyadhi* Sankara refers to group of diseases.

एवं कृच्छ्रतमा नृणां दृश्यन्ते व्याधिसङ्कराः।
प्रयोगापरिशुद्धत्वात्तथा चान्योन्यसंभवात्॥2 2॥

Ca.Ni. – 8/22

As per *Charaka*, the state of *Vyadhi Sankara* (group of diseases) is very difficult to cure. It occurs due to two primary causes.

1. ***Prayoga Aparishuddhatva*** – improper administration of line of treatment. For example, in a patient suffering from *Amatisara*, if *Stambhana* line of treatment is disease to check the movement of loose stools from the body it may be responsible for *Shula* (pricking type of pain in abdomen), *Anaha* (distension of the abdomen) and *Adhmana* (distension of the abdomen associated with pain).
2. ***Anyonya Sambhava*** – occurrence of secondary disease due to the presence of primary disease. For example, the manifestation of the *Pratishyaya* (rhinorrhoea) will be invariably responsible for the occurrence of *Kasa* (cough) if proper measures are not being taken to revert the pathological process in the body and the suffering individual is consuming the etiological factor continuously.

Vyadhi Avastha

The term *'Vyadhi Avastha'* refers to the stage of the disease. This will help in determining status of *Dosha* in the manifestation the disease, the status of the *Dushya* in the body, affliction of *Srotas* in the manifestation, nature of affliction of *Srotas* (Srotodushti), involvement of *Rogamarga*, planning the line of treatment and suggesting the diet and regimen to be followed and avoided during the process of treatment.

One of the possible ways of assessment of stage of the disease as follows

- ⇨ Whether there is increased or decreased state of the *Dosha* (bioenergy) in the body? Is it Single *Dosha* (bioenergy) affliction or multiple *Dosha* (bioenergy) affliction? Whether *Sharirika* or *Manasika Dosha* involvement is present or not? Is it present in any specific location or multiple locations? Whether vitiated *Dosha* show symptoms in a particular time of the day or throughout the day? Is there any increase of one particular *Guna* such as *Snigdha* (unctuousness) or *Khara* (rough) or increase of multipe *Guna* is seen?

- Whether one *Dhatu* (body tissue) or multiple *Dhatu* (body tissue) or Mala (excretory product) is afflicted in the body? Is it in the increased state or decreased state?
- Whether one or multiple *Srotases* are afflicted in the body? The type of *Srotodushti* involved in the disease process – is it *Atipravritti* (excess movement) or *Sanga* (obstruction) or *Siragranthi* (swelling in blood vessel) or *Vimargagamana* (movement in the body other than their normal route)?
- Whether there is presence or absence of *Ama* (undigested food material) in the body? Is it in *Koshtha* (alimentary canal) or *Shakha* (extremities) or *Marmasthi Sandhi* (vital parts or joints)? Is it in *Saama* (*Ama* mixed with *Dosha* or *Dushya*) state or *Niraama* (status of the body devoid of *Ama* mixed with *Dosha* or *Dushya*) state?
- Whether the disease is in the state of *Ama* (initial state), *Pachyamana* (inflammatory state) or *Pakva* (suppurative) state?
- Whether the vitiated *Dosha* is *Prakrita* (natural course of vitiation) or *Vaikrita* (unnatural course of vitiation)?
- Whether the disease is *Adhyatmika* (disease manifested due to misdeeds of self) or *Adhibhautika* (disease manifested due to the misdeeds of others or animals or weapons etc) or *Adhidaivika* (disease occurring in an individual due to supra human power)?
- Whether *Jatharagni* (main digestive fire) is afflicted or *Dhatvagni* (fire of respective *Dhatu*) is afflicted or *Bhutagni* (fire of respective *Mahabhuta*) is afflicted or either two or all types of Agni afflicted or not?
- Whether one *Rogamarga* or two *Rogamarga* or all three *Rogamarga* are afflicted or not?
- Whether the disease is *Sukhasadhya* (easy to cure) or *Krichrasadhya* (difficult to cure) or *Yapya* (manageable) or *Asadhya* (incurable)?

Ayurveda described several terms in different contexts as far as the stage of the disease is concerned. Few of the examples are as follow:

- ***Antarvega* and *Bahirvega*–** explained in the context of *Jvara*
- ***Saama*, *Pachyamana* and *Nirama*–** explained in the context of *Jvara*
- ***Uttana* and *Gambhira*–** explained in the context of *Vatarakta*
- ***Prakrita* and *Vaikrita*–** explained in the context of *Jvara*
- ***Doshapaka* and *Dhatupaka*–** explained in the context of *Jvara*
- ***Ashayapakarsha*–** explained in the context of classification of *Nidana*
- ***Anubandhya* and *Anubandha*–** explained in the context of classification of disease
- ***Sukhasadhya*, *Krichrasadhya*, *Yapya* and *Pratyakhyeya*–** explained based on the context of curability and incurability
- ***Shakhagata*, *Koshthagata* or *Marmasthi Sandhigata*–** explained in the context of presence of *Dosha* in different parts of the body.
- Still much more examples can be drawn.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya excerpts

Key points of the chapter

- Samanyaja Vikaras are those diseases where the dominance of Dosha may vary in different stages of the illness. In Nanatmaja Vikaras, the dominance of Dosha may remain same through out the progression of the disease. Charaka has mentioned 48 Samanyaja Vikaras. Sushruta has mentioned totally 1120 diseases. 80 types of Vataja Nanatmaja Vikara; 40 types of Pittaja Nanatmaja Vikaras and 20 types of Kaphaja Nanatmaja Vikaras are mentioned in Charaka Samhita. Sharangadhara has mentioned 10 types of Raktaja Nanatmaja Vikaras also.
- **Nidanarthakara Roga–** means one disease becomes the cause for another disease. For example, the manifestation of Jvara may become the cause for the manifestation of Raktapitta. Two types of Nidanarthakara Roga are mentioned – Ekarthakari and Ubhayarthakari. The term Ekarthakari refers to the development of secondary disease where in primary disease disappears and in Ubhayarthakari type, both primary and secondary diseases can be observed in the patient at a particular point of time.
- **Hetu Sankara:** this comprises two words – Hetu (cause) and Sankara (group). One Hetu becomes the cause for many diseases and in some occasions only one disease will be manifested. Multiple Hetus are responsible for the manifestation of single disease and multiple diseases.
- **Linga Sankara: comprises two words–** Linga (clinical features) and Sankara (group). One Linga (clinical feature) can be seen in many diseases and in some occasions, it is seen in only one disease. Multiple Linga (clinical features) can be seen in one disease and in multiple diseases.
- **Vyadhi Sankara: comprises two words–** Vyadhi (disease) and Sankara (group). This occurs because of two main reasons – Prayoga Aparishuddhatva (improper administration of medicine)and Anyonya Sambhava (occurrence of secondary disease due to the presence of primary disease).
- **Vyadhyavastha–** refers to the stage of the disease. This will help in determining the status of Dosha in the manifestation of disease, status of Dushya in the body, affliction of Srotas, involvement of Rogamarga, planning of treatment and suggesting Pathya and Apathya to the patient during the course of the treatment.

Probable questions may be asked in the examination

Long essays

- Define Nanatmaja Vyadhi and explain Vataja Nanatmaja Vikara
- Enumerate Vataja or Pittaja or Kaphaja Nanatmaja Vyadhi
- Explain Vataja or Pittaja or Kaphaja Nanatmaja Vikara

Short essays

- Write about Vyadhi Avastha
- Uttana and Gambhiravastha in Vyadhi
- Explain Nidanarthakara Vyadhi
- Nanatmaja Vyadhi
- Pittaja Nanatmaja Vikara
- Explain Vyadhinam Nanatmaja Karana
- Write Antarvegi and Bahirvegi Lakshana
- Hetu Sankara with exampes
- Linga Sankara with examples
- Vyadhi Sankara with examples
- Nidanarthakara Roga and Vyadhi Sankara

Short answers

- ⇨ Nidanarthakaratva
- ⇨ Bahirvegavastha
- ⇨ Antarvega and Bahirvegavastha
- ⇨ Linga Sankara
- ⇨ Hetu Sankara
- ⇨ Vyadhi Sankara
- ⇨ Nanatmaja Vyadhi
- ⇨ Nidanarthakara Roga
- ⇨ Define Nanatmaja Vyadhi
- ⇨ Write Hetusankar

MCQs

1. **Dhamani Pratichaya is .... Nanatmaja Vikara.**
   a. Vataja;
   b. Pittaja;
   c. Kaphaja;
   d. Raktaja
   Answer -(c)
2. **Hikka is .... Vikara.**
   a. Samanyaja;
   b. Nanatmaja;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
3. **Kamala is .... Vikara.**
   a. Samanyaja;
   b. Nanatmaja;
   c. Both 1 and 2;
   Answer -(c)
4. **Pratishyaya if not treated, immediately it will lead to the manifestation of**
   a. Kasa;
   b. Kshaya;
   c. Shosha;
   d. None of the above
   Answer -(a)
5. **As per Sharangadhara, the number of Raktaja Nanatmaja Vikara is**
   a. 10;
   b. 20;
   c. 40;
   d. 80
   Answer -(a)
6. **Total number of Samanyaja Vikara as per Charaka is**
   a. 24;
   b. 48;
   c. 72;
   d. 96
   Answer -(b)
7. **Which of the following is Vataja Nanatmaja Vikara?**
   a. Udarda;
   b. Tvak Avadarana;
   c. Timira;
   d. Putigandhata
   Answer -(c)
8. **Which of the following is not Kaphaja Nanatmaja Vikara?**
   a. Galaganda;
   b. Mukhasrava;
   c. Tripti;
   d. Badhirya
   Answer -(d)
9. **Types of Trishna as per Charaka**
   a. Four;
   b. Five;
   c. Seven;
   d. Eight
   Answer -(b)
10. **Maha, Urdhva, Chinna, Tamaka and Kshurdra are the types of**
   a. Kasa;
   b. Hikka;
   c. Shvasa;
   d. Unmada
   Answer -(c)

***

Dhatu Pradoshaja Vikara

7

Learning objectives

- ⇨ To know the description of Dhatu Pradoshaja Vikara
- ⇨ To know the description of Upadhatu Pradoshaja Vikara
- ⇨ To know the description of Mala Pradoshaja Vikara
- ⇨ To know the description of Indriya Pradoshaja Vikara

The description of *Dhatu Pradoshaja Vikara* is available in 28th chapter of *Sutra Sthana* of *Charaka Samhita*. The detailed description with current understanding is seen in the context of *Srotas* regarding *Srotodushti Lakshana*. In other words to say, if the question is asked regarding *Dhatu Pradoshaja Vikara*[1], one should say the *Dhatuvaha Srotodushti Lakshana* and vice versa.

Rasa Pradoshaja Vikara

अश्रद्दा चारुचिश्चास्यवैरस्यमरसज्ञता।
हल्लासो गौरवं तन्द्रा साङ्गमदी ज्वरस्तमः॥
पाण्डुत्वं स्त्रोतसां रोधः क्लैब्यं सादः कृशाङ्गता।
नाशोऽग्नेरयथाकालं वलयः पलितानि च॥
रसप्रदोषजा रोगा ......। च.सू. - 28/9-11॥

- ⇨ *Asraddha* (though the person takes food, one will not be having any craving for food);
- ⇨ *Aruchi* (the person will not take food or there will be tastelessness);
- ⇨ *Asyavairasya* (the person will be having perception of improper taste);
- ⇨ *Arasajnata* (the person will not be having perception of taste);
- ⇨ *Hrillasa* (nausea);
- ⇨ *Gourava* (heaviness of the body);
- ⇨ *Tandra* (drousiness);
- ⇨ *Sangamarda* (pain all over the body or myalgia);
- ⇨ *Jvara* (raised body temperature);
- ⇨ *Tama* (blackout or darkness in front of the eyes);
- ⇨ *Pandutva* (yellowish white discolouration of body or anemia);
- ⇨ *Sroto Rodha* (obstruction in Srotas);
- ⇨ *Klaibya* (inability to perform sexual activity or impotence or erectile dysfunction);
- ⇨ Sada (reduced activity of body parts);
- ⇨ *Krishangata* (emaciation of the body);
- ⇨ *Agninasha* (decreased function of digestive fire);
- ⇨ *Vali* and *Palita* in *Ayathakala* (premature development of wrinkles and greying of scalp hair)

Rakta Pradoshaja Vikara

वक्ष्यन्ते रक्तप्रदोषजाः॥
कुष्ठवीसर्पपिडका रक्तपित्तमसृग्दरः।
गुदमेढ्रास्यपाकश्च प्लीहा गुल्मोऽथ विद्रधिः॥
नीलिका कामला व्यङ्गः पिप्लवस्तिलकालकाः।
दद्रुश्चर्मदलं श्वित्रं पामा कोठास्त्रमण्डलम्।
रक्तप्रदोषाज्जायन्ते ....॥ च.सू. -28/11-13

- ⇨ *Kushtha* (any skin disease);

GK [1] The relevance of *Dhatu Pradoshaja Vikara* refer the context of *Dhatuvaha Srotodushti Lakshana* reduced sweat production); *Mala Pradooshana* (*Mala* having the dominance of *Dosha* dominance showing altered colour etc); *Mala Sanga* (*Apravritti* of *Purisha*, *Mutra* or *sweda* or any *Mala* such as *Karnamala*, *Akshimala* etc) or accumulation of these *Mala* in the respective sites; *Mala Utsarga* (*Atipravritti* of *Purisha*, *Mutra*, *Sveda* or any *Mala*) or excess movement of these *Mala* through respective sites.

Bheda: this term is particularly used for *Purisha* only. This means the unformed stools which may range from liquid stools (*Dravamala*) or semisolid stools. This is observed in *Atisara*, *Pravahika*, *Visuchika*, *Grahani Roga*.

Mala Shosha: This term depicts the reduction in amount of all *Malas*. This may be either hard stools or scybalous stools or reduction in the production of *Mutra* or *Sveda* or other *Malas* such as *Netramala*, *Karnamala* etc.

Mala Pradushana: This suggests the involvement of *Dosha* and appearance of *Mala*. For example, in the *Mala* which has *Vata Pradhanyata*, one may expect the very hard stool, blackish discolouration of the faecal matter.

Mala Sanga: this refers to the complete cessation of passage of either *Purisha* or *Mutra* or *Sveda* or any *Mala* in the body. Here, the *Purisha* or *Mutra Sanga* may be sometimes voluntary and rest of the *Malas*, the *Sanga* may be of involuntary in nature. The examples for *Mala Sanga* are *Anaha*, *Mutraghata*, *Taruna Jvara* etc.

Mala Utsarga: this refers to excess passage of either *Purisha*, *Mutra* or *Sveda* or any other *Mala* in the body. The examples for *Mala Utsarga* are *Atisara*, *Grahani*, *Visuchika*, *Prameha*, *Jvara Vimuktavastha* etc.

मलानाश्रित्य कुपिता भेदशोषप्रदूषणम्।
दोषा मलानां कुर्वन्ति सङ्गोत्सर्गावतीव च॥2 2॥
मलानित्यादौ भेदशोषप्रदूषणमिति यथासंभवं ज्ञेयं; तत्र भेदः पुरीषस्य, शोषस्तु विशेषेण सर्वमलेषु संभवति, प्रदूषणं तु प्रदुष्टवर्णादियुक्तत्वेन प्राकृतवर्णाद्युपघातः। संगोत्सर्गावतीव चेति अतीव सङ्गः अप्रवृत्तिः, अत्युत्सर्गास्तु अतिप्रवृत्तिः॥2 2॥

Clinical application

- ☐ ***Krite Apyakrita Sanjnatam*** – refers to the presenting complaint increased frequency of micturition. It is a known fact that the person gets the urge of micturition when the urinary bladder filled by 200 – 250 ml of urine. Any condition resulting increase in the blood supply to the kidney leads to the above presenting complaint.
- ☐ 55 years old male patient is presented with gradual onset of breathlessness on exertion for the past six months followed by episodes of breathlessness at night for the past four months associated with increased micturition at night time. In this case history, we can able to infer the involvement of *Pranavaha Srotas* as well as *Mutravaha Srotas* where in we can see increase in *Mutra*.
- ☐ 30 years male patient is presented with altered bowel habits for the past one and half years. The altered bowel habits were passage of semisolid to liquid stools associated with weight loss. In this case history, involvement of *Purisha* is observed. This is considered as *Ati Utsarga* type of *Mala Pradoshaja Vikara*.
- ☐ *Mala*[2] *Pradoshaja Vikara* is not the diagnosis of the disease; it is pathological process happening inside the body.

Indriya Pradoshaja Vikara

इन्द्रियाणि समाश्रित्य प्रकुप्यन्ति यदा मलाः।
उपघातोपतापाभ्यां योजयन्तीन्द्रियाणि ते॥ च.सू. 28/20

Indriya pradoshaja vikaras as per *Caraka* include *Upaghata* and *Upatapa*.

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[2] As far as the amount of the Mala formed in 24 hours is concerned from the western medical point of view, urine will be formed at around 200 – 250 ml in one frequency, 1200 – 1500 ml in 24 hours; and amount of faecal matter is around 100 – 150 ml at the time of defaecation and sweat is formed around 100 ml in 24 hours

The word *Upaghata* refers to complete loss of function of the *Indriyas*, whereas *Upatapa* refers to partial loss of function of *Indriyas*.

As per *Ayurveda*, there are *Ekadasa Indriyas*, namely *Pancha Jnanendriyas*, *Pancha Karmendriyas* and one *Ubhayendriya*. *Jnanendriyas* are *Srotrendriya*, *Sparsanendriya*, *Ghranendriya*, *Rasanendriya* and *Caksurendriya*. *Karmendriyas* are *Vak*, *Pani*, *Pada*, *Payu* and *Upastha*. The functions of *Jnanendriya* are *Sravana* (hearing), *Sparshana* (touch sensation), *Darshana* (vision), *Gandha grahana* (smell) and *Rasa Grahana* (taste perception). The functions of *Karmendriya* are *Svara* (voice production), *Grahana* (holding any objects), *Gamana* (movement of the body from one place to another) and *Visarga* (expulsion of *Purisha* to the exterior) and *Ananda* (attaining orgasm through sexual activities). The functions of *Ubhayendriya* or *Manas* are

The terms **'*Upaghata*'** and **'*Upatapa*'** can be applied both to *Jnanendriyas* and *Karmendriyas*. For example, *Upaghata* in relation to *Srotrendriya* refers to complete and irreversible loss of hearing in case of rupture of tympanic membrane and *Upatapa* refers to partial and reversible or irreversible loss of hearing could be due to impacted wax in the ear or due to upper respiratory tract infection. The abnormality may be present from nose, nasal mucosa, ethmoid bone, olfactory nerve and olfactory area situated in the brain, i.e., the whole pathway of olfaction should be considered for the abnormal function of olfaction. The same thing can be applied to other *Jnanendriyas* and *Karmendriyas* also.

Clinical application of Indriya Pradoshaja Vikara

The following is the description of *Upaghata* and *Upatapa* in relation to different *Indriyas*.

उपघातेत्यादौ उपघातौ विनाशः, उपतापस्तु किंश्चिद्वैकल्यम्॥2 0॥ Chakra, Ca.Su. – 28/20

Table 7.1: Indriya and disturbances observed in the affliction of Indriya

Indriya	Upaghata	Upatapa
Srotrendriya	Accumulation of wax in external auditory canal	Rupture of tympanic membrane or damage to hearing centre in temporal region of cerebral hemisphere
Sparshanendriya	Peripheral neuropathy	Transection of spinal cord
Darshanendriya	Refractive errors	Injury to the cornea in front of pupil
Rasanendriya	Drinking very hot tea responsible for temperory loss of taste perception	Serious illness involving tongue such as malignancy of the tongue
Ghranendriya	Upper respiratory tract obstruction	Injury to the forehead resulting in olfactory nerve injury
Pani	Injury to middle finger	Carpal tunnel syndrome
Pada	Sciatica syndrome	Complete dissection of spinal cord
Payu	Haemorrhoids	Anal incontinence
Upastha	Urinary tract infection	Urinary incontinence
Vak	Upper respiratory infection	Vocal cord paralysis or carcinoma of vocal cords

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya excerpts

Key points of the chapter

- ➪ Dhatu Pradoshaja Vikara are mentioned in 28th chapter of Sutra Sthana of Charaka Samhita. The descriptions mentioned in this context are the same which can be considered in the context of clinical features of respective Dhatuvaha Srotodushti. The current understanding of these clinical features are elaborately discussed in the context of Srotas chapter.
- ➪ Upadhatu Pradoshaja Vikara where in Upadhatu affliction is seen of respective Dhatu; Mala Pradoshaja Vikara where in affliction of Trimala – Mutra (urine), Purisha (faecal matter) and Sveda (sweat) and Indriya Pradoshaja Vikara where in Jnanendriya (sense organs) and Karmendriya (organs of action) involvement is observed.

Probable questions may be asked in the examination

Long essays

- ➪ What are Upadhatu Pradoshaja Vikara – discuss in detail
- ➪ Explain Pradoshaja Vikara and explain Rasa Pradoshaja Vikara in detail

Short essays

- ➪ Rasa Pradoshaja Vikara
- ➪ Upadhatu Pradoshaja Vikara
- ➪ Indriya Pradoshaja Vikara
- ➪ Explain Rakta Pradoshaja Vyadhi
- ➪ Describe Rasa Pradoshaja Vyadhi
- ➪ Mala Pradoshaja Vikara
- ➪ Medo Dhatu Dushti Lakshana with specific diseases

Short answers

- ➪ Write Rakta Pradoshaja Vikara
- ➪ Name the Mamsa Pradoshaja Vikara
- ➪ Indriya Upaghata
- ➪ Indriya Pradoshaja Vikara
- ➪ Mala Pradoshaja Vikara
- ➪ Upadhatu Pradoshaja Vikara
- ➪ Upadhatu
- ➪ Sveda Pradoshaja Vyadhi
- ➪ Write diseases of Upadhatu Pradoshaj
- ➪ Write Upadhatu Pradoshaja Vikar

MCQs

1. **Anal incontinence is an example of**
   a. Indriya Upaghata;
   b. Indriya Upatapa;
   c. Both 1 and 2;
   d. None of the above
   Answer -(a)
2. **Premature hair fall can be categorized under**
   a. Majja Pradoshaja Vikara;
   b. Asthi Pradoshaja Vikara;
   c. Shukra Pradoshaja Vikara;
   d. Medo Pradoshaja Vikara
   Answer -(b)
3. **Asrigdara (excessive menstruation) can be considered under ....Pradoshaja Vikara.**
   a. Rasa;
   b. Rakta;
   c. Mamsa;
   d. Shukra
   Answer -(b)
4. **Klaibya is categorized under .... Pradoshaja Vikara.**
   a. Rasa;
   b. Shukra;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
5. **Arbuda is categorized under**
   a. Rasa Pradoshaja Vikara;
   b. Mamsa Pradoshaja Vikara;
   c. Majja Pradoshaja Vikara;
   d. Medo Pradoshaja Vikara
   Answer -(b)

***

8

Ashta Mahagada

Learning objectives

- ➪ The meaning of Mahagada
- ➪ The descriptions of Ashta Mahagada as per Charaka, Sushruta and Vagbhata
- ➪ Relevance of Ashta Mahagada

The meaning of Mahagada

The term *Gada* is one of the the synonym of *Vyadhi* or *Vikara*. The term *Mahagada* refers to the major disease afflicting the human body which may be responsible for the or severe morbidity or mortality of the individual. These are eight in number as per different *Ayurvedic* literatures.

महागदाः इति मारणात्मकत्वात् असाध्यत्वाच्च
महत्त्वमेषामिति। Su.Su. – 33/3-4-/

As per *Sushruta,* the term *Mahagada* meets two important criteria namely, *Maranatmaka* (responsible for the mortality of the individual) and *Asadhyatva* (incurability of the illness).

Causative factors of Ashta Mahagada

कुर्याद्विरुद्धमशनं ज्वरमस्त्रपित्तमष्टौ गदांश्च महतो विषवच्च
मृत्युम्॥1 1॥ A.S.Su. – 9/11-7

As per *Ashtanga Sangraha,* main causative factor of *Ashta Mahagada* is *Viruddha Ashana* (consumption of unwholesome or incompatible diet).

Ashta Mahagada as per different Ayurveda scholars

वातव्याध्यश्मरीकुष्ठमेहोदरभगन्दराः।
अर्शांसि ग्रहणीत्यष्टौ महारोगाः सुदुस्तराः॥3 3॥
A.S.Ni. – 8/33

वातव्याध्यश्मरीकुष्ठमेहोदरभगन्दराः।
अर्शांसि ग्रहणीत्यष्टौ महारोगाः सुदुस्तराः॥3 0॥
A.Hr.Ni. – 8/30

As per *Ashtanga Sangraha* and *Ashtanga Hridaya, Ashta Mahagada* are *Vatavyadhi* (a set of diseases afflicting the human body where in vitiation of *Vata* is observed), *Ashmari* (urinary calculi), *Kushtha* (all sorts of skin diseases), *Prameha* (a group of disorders where in excess and turbid urine is passed), *Udara* (ascites), *Bhagandara* (fistula in ano), *Arshas* (haemorrhoids) and *Grahani* (a chronic disease of alimentary canal where in undigested food material passed and the passage of liquid to semisolid stools are passed frequently) because of their incurable nature.

वातव्याधिः प्रमेहश्च कुष्ठमर्शां भगन्दरम्॥
अश्मरी मूढगर्भश्च तथैवोदरमष्टमम्॥4॥
अष्टावेते प्रकृत्यैव दुश्चिकित्स्या महागदाः॥
Su.Su. – 33/4-5

As per *Sushruta,* the names of *Ashta Mahagada* are *Vatavyadhi* (a set of diseases afflicting the body where in vitiation of *Vata* is seen), *Prameha* (a set of diseases where in excess and turbid urine is passed), *Kushtha* (all types of skin diseases), *Arshas* (haemorrhoids), *Bhagandara* (fistula in ano), *Ashmari* (urinary calculi), *Mudhagarbha* (abnormal positions of fetus in the uterus), *Udara* (ascites). By nature, these diseases are considered as incurable.

वातव्याधिरपस्मारी कुष्ठी शोफी तथोदरी।
गुल्मी च मधुमेही च राजयक्ष्मी च यो नरः॥8॥
अचिकित्स्या भवन्त्येते बलमांसक्षये सति। Ca.I. – 9/8-9

As per *Charaka,* the names of *Ashta Mahagada* are *Vatavyadhi* (a set of diseases where in vitiation of *Vata Dosha* are seen), *Apasmara* (a set of convulsive disorders), *Kushtha* (all types of skin diseases), *Shopha* (group of diseases where in generalised or localised swelling is seen), *Udara* (ascites), *Gulma* (a set of diseases abdominal swelling is seen), *Madhumeha* (diabetes mellitus) and *Rajayakshma* (tuberculosis). These diseases are incurable due to the decrease of physical strength and muscles.

Table 8.1: Ashtamahagada as per different Ayurveda scholars

S. No.	Charaka Ca.I. – 9/8-9	Sushruta Su.Su. – 33/4-5	Vriddha Vagbhata A.S.Ni. – 8/33	Ashtanga Hridaya A.Hr.Ni. – 8/30
1	Vatavyadhi	Vatavyadhi	Vatavyadhi	Vatavyadhi
2.	Apasmara	Prameha	Ashmari	Ashmari
3.	Kushtha	Kushtha	Kushtha	Kushtha
4.	Shopha	Arshas	Meha	Meha
5.	Udara	Bhagandara	Udara	Udara
6.	Gulma	Ashmari	Bhagandara	Bhagandara
7.	Madhumeha	Mudhagarbha	Arshas	Arshas
8.	Rajayakshma	Udara	Grahani	Grahani

The reasons for the incurability of Ashta Mahagada as per Sushruta

प्राणमांसक्षयश्वासतृष्णाशोषवमीज्वरैः॥5॥
मूर्च्छातिसारहिक्काभिः पुनश्चैतैरुपद्रुताः॥
वर्जनीया विशेषेण भिषजा सिद्धिमिच्छता॥6॥

Su.Su. – 33/5-6

The above eight diseases are incurable if these are associated with *Prana Kshaya* (diminution of physical strength), *Mamsa Kshaya* (diminution of muscle), *Shvasa* (breathing discomfort), *Trishna* (thirst), *Shosha* (excess emaciation of the body), *Vami* (vomiting), *Jvara* (disease where in raised body temperature is seen), *Murcha* (altered state of consciousness), *Atisara* (diarhhoea), *Hikka* (hiccup).

Vatavyadhi (disease of nervous system and connective tissue)

शूनं सुप्तत्वचं भग्नं कम्पाध्माननिपीडितम्॥
नरं रुजार्तमन्तश्च वातव्याधिर्विनाशयेत्॥7॥

Su.Su. – 33/7

As per *Sushruta*, if *Vatavyadhi* associated with *Shuna* (generalised or localised swelling), *Supta Tvacha* (numbness or tingling sensation of the skin), *Bhagna* (fractures), *Kampa* (involuntary movements), *Adhmana* (distension of the abdomen), *Ruja* (deep seated pain), then such type of *Vatavyadhi* is very difficult to cure.

वायोरतिबलत्वेन आशुकारित्वेन च गरीयस्त्वात्तद्विकाराणां दुः साध्यत्वादाश्चेवात्यय- करत्वाद्विशिष्टचिकित्सा- त्वाद्वातव्याध्यभिधानं Ma.Ni. – 22/4, Madhu

The individual who is suffering from *Vatavyadhi* is considered as incurable because *Vata* is very powerful and capable of manifesting acute insidious diseases. As far as diseases of *Pitta* and *Kapha Dosha* are concerned, the number of *Vata* dominant disease are more in number. They need specific line of treatment to avoid complications.

विभुत्वादाशुकारित्वाद्बलित्वादन्यकोपनात्।
स्वातन्त्र्याद्बहुरोगत्वाद्दोषाणां प्रबलोऽनिलः॥84॥

A.Hr.Sha. – 3/84

As per *Vagbhata*, the *Vata* is considered to be very powerful among the *Sharirika Dosha* because of *Vibhutva* (omnipresence), *Ashukaritva* (responsible for the manifestation of acute manifestations), *Balitva* (more powerful among other *Dosha*), *Anyakopana* (lead to the vitiation of other *Dosha* and *Dhatu*), *Svatantrya* (independent in manifestation of the symptoms), *Bahurogatva* (responsible for the manifestation of multiple diseases).

Apasmara (convulsive disorders)

बहुशोऽपस्मरन्तं तु प्रक्षीणं चलितभ्रुवम्॥
नेत्राभ्यां च विकुर्वाणमपस्मारो विनाशयेत्॥26॥

Su.Su. – 33/26

Apasmara (convulsive diseases) will kill the patient who has the features of *Bahusho Apasmaranta* (frequent fainting), *Prakshina* (too much emaciation), *Chalita Bhruva* (unsteady eye brows), *Netra Vikriti* (abnormal movements of the eye ball).

स्मृतिर्भूतार्थविज्ञानमपश्च परिवर्जने।
अपस्मार इति प्रोक्तस्ततोऽयं व्याधिरन्तकृत्॥3॥

Su.Ut. – 61/3

The person will lose his life if he is suffering from loss of rememberance of past objects and knowledge of nature of things.

Kushtha (all types of skin diseases)

प्रभिन्नं प्रस्रुताङ्गं च रक्तनेत्र हतस्वरम्॥
पञ्चकर्मगुणातीतं कुष्ठं हन्तीह कुष्ठिनम्॥9॥ Su.Su. – 33/9

The incurability of *Kushtha* is associated with *Prabhinna Prasritanga* (tearing or splitting of the body parts), *Raktanetra* (reddish discolouration of the eyes), *Hatasvara* (loss of voice) and is beyond the control of *Panchakarma* line of treatment.

Raktapitta (bleeding disorders)

लोहितं छर्दयेद्यश्च बहुशो लोहितेक्षणः॥
रक्तानां च दिशां द्रष्टा रक्तपित्ती विनश्यति॥24॥

Su.Su. – 33/24

The person who is presented with vomiting of the blood frequently, reddish discolouration of the eyes and vision of the surroundings as having red colour, is considered as suffering from incurable *Raktapitta* (bleeding disorders) and he will be killed by the disease.

Udara Roga

पार्श्वभङ्गान्नविद्वेषशोफातिसारपीडितम्॥
विरिक्तं पूर्यमाणं च वर्जयेदुदरार्दितम्॥14॥

Su.Su. – 33/14

The person suffering from *Udara Roga* will be killed by the disease if he is presented with pain in the flanks, aversion towards food intake, generalised swelling, diarrhoea, abdomen getting filled even after purgation.

Gulma

श्वासशूलपिपासान्नविद्वेषग्रन्थिमूढताः॥
भवन्ति दुर्बलत्वं च गुल्मिनो मृत्युमेष्यतः॥21॥

Su.Su. – 33/21

The person suffering from *Gulma* will be killed by the disease if he is presented with breathlessness, pricking type of pain, thirst, aversion towards food intake, cystic swelling, irregular movement of *Vata* and the person becomes weak.

Madhumeha

यथोक्तोपद्रवाविष्टमतिप्रस्रुतमेव वा॥
पिडकापीडितं गाढं प्रमेहो हन्ति मानवम्॥8॥

Su.Su. – 33/8

The person suffering from *Madhumeha* will be killed by the disease if he is presented with complications or with excess micturition and multiple deep seated skin eruptions.

Rajayakshma

शुक्लाक्षमन्नद्वेष्टारमूर्ध्वश्वासनिपीडितम्॥
कृच्छ्रेण बहु मेहन्तं यक्ष्मा हन्तीह मानवम्॥20॥

Su.Su. – 33/20

The person suffering from *Rajayakshma* will be killed by the disease if he is presented with whitish discolouration of the eyes, aversion towards food intake, expiratory breathlessness, frequent difficulty in micturition.

Bhagandara

वातमूत्रपरीषाणि क्रिमयः शुक्रमेव च॥
भगन्दरात् प्रस्रवन्ति यस्य तं परिवर्जयेत्॥11॥

Su.Su. – 33/11

The person suffering from *Bhagandara* will be killed by the disease if he is presented with presence of flatus, urine, faecal matter, worms and semen from the fistulous track.

Arshas

तृष्णारोचकशूलार्तमतिप्रस्रुतशोणितम्॥
शोफातीसारसंयुक्तमर्शोव्याधिर्विनाशयेत्॥10॥

Su.Su. – 33/10

The person suffering from *Arshas* will be killed by the disease if he is presented with thrist, tastelessness, abdominal pain, excess bleeding from the anus, swelling, diarrhoea.

Ashmari

प्रसूननाभिवृषणं रुद्धमूत्ररुगन्वितम्॥
अश्मरी क्षपयत्याशु सिकता शर्करान्विता॥1 2॥

Su.Su. – 33/12

The person suffering from *Ashmari* will be killed by the disease if he is presented with swelling of the umbilicus, scrotal region, retention of urine, severe pain and micturition associated with presence of urinary gravel.

Mudhagarbha

गर्भकोषपरासङ्गो मक्कल्लो योनिसंवृतिः॥
हन्यात् स्त्रियं मूढगर्भे यथोक्ताश्चाप्युपद्रवाः॥1 3॥

The person suffering from *Mudhagarbha* will be killed by the disease if the lady is presented with obstruction in the uterus, post partum pain, vaginal constriction and other complications observed in confounded uterus.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha and Ashntanga Hridaya excerpts

Key points of the chapter

- ⇨ Ashta Mahagada are eight different types of diseases which are very difficult to cure. This is occurring due to excess loss of physical strength and atrophy of the muscles.
- ⇨ In the present chapter, Ashta Mahagada as per Charaka, Sushruta and Vagbhata are highlighted and description in the context of Mahagada is explained in brief. Among Ashta Mahagada, Vatavyadhi, Udara, Kushtha are mentioned by Charaka, Sushruta, Vriddha Vagbhata and Laghu Vagbhata. Arshas, Bhagandara, Ashmari are mentioned by Sushruta, Vriddha Vagbhata and Laghu Vagbhata.

Probable questions may be asked in the examination

Short essays

⇨ Explain Ashta Mahagada

Short answers

⇨ Enumerate Ashta Mahagada

MCQs

1. **Mudhagarbha is the type of Ashta Mahagada mentioned by**

   a. Charaka;
   b. Sushruta;
   c. Vriddha Vagbhata;
   d. Laghu Vagbhata

   Answer -(b)

2. **Which of the following disease/s is/are mentioned by all Brihat Trayis?**

   a. Vatavyadhi;
   b. Udara;
   c. Kushtha;
   d. All of the above

   Answer -(d)

3. **Rajayakshma is the type of Ashta Mahagada mentioned by**

   a. Charaka;
   b. Sushruta;
   c. Vriddha Vagbhata;
   d. Laghu Vagbhata

4. **Gulma is the type of Ashta Mahagada mentioned by**

   a. Charaka;
   b. Sushruta;
   c. Vriddha Vagbhata;
   d. Laghu Vagbhata

5. **Shopha is the type of Ashta Mahagada mentioned by**

   a. Charaka;
   b. Sushruta;
   c. Vriddha Vagbhata;
   d. Laghu Vagbhata

***

9

Ashta Nindita

Learning objectives

- ⇨ The meaning of Ashta Nindita
- ⇨ The people who are considered as Nindita or despicable to treatment
- ⇨ The reason of considering 8 people as Nindita or despicable to the treatment
- ⇨ Relevance of the concept of Ashta Nindita in current era

The meaning of Ashta Nindita

In Sanskrit language, the term *Ashta* means eight in number and *Nindita* refers to the people who are despicable in relation to the principles of treatment. These are the eight people who are not suitable for general line of treatment. The reference is available in 21st chapter of *Sutra Sthana* of *Charaka Samhita.*

The people included in Ashta Nindita Purusha

इह खलु शरीरमधिकृत्याष्टौ पुरुषा निन्दिता भवन्ति; तद्यथा-अतिदीर्घश्च, अतिह्रस्वश्च, अतिलोमाच, अलोमा च, अतिकृष्णश्च, अतिगौरवश्च, अतिस्थूलश्च, अतिकृशश्चेति॥3॥ Ca.Su. – 21/3

1. *Ati Dirgha* (too tall)
2. *Ati Hrasva* (too short)
3. *Ati Loma* (too much hairy)
4. *Aloma* (Hairless)
5. *Ati Krishna* (too dark or black)
6. *Ati Gaura* (too fair)
7. *Ati Sthula* (too obese)
8. *Ati Krisha* (too emaciated)

Gangadhara included three more

शरीरनिन्दाधिकाराच्चोक्ताः कुब्जकाणभङ्गगदयश्चैकदेश-निन्दित्वान्नोक्ताः॥ Ca.Su. 21/3, Gangadhara

9. *Kubja* (hump backed)
10. *Kana* (one eyed)
11. *Bhangura* (crooked or bent)

Ati Sthula Purusha

Causative factors of Ati Sthaulya

तदतिस्थौल्यमतिसंपूरणद्गुरुमधुरशीतस्निग्धोपयोगादव्या-यामादव्यवायाद्दिवास्वाद्धर्षनित्यत्वादचिन्तनाद्बीजस्व-भावाच्चोजायते। Ca.Su. 21/4

- ⇨ *Ati Sampurana* (excess intake of nutritive diet)
- ⇨ *Guru, Madhura, Shita, Snigdha Upayoga* (excess intake of substances having *Guru Guna* (heavy to digest), *Madhura* (substances having sweet taste), *Shita Guna* (cold substances), *Snigdha* (unctuous substances)
- ⇨ *Avyayama* (lack of physical exercise)
- ⇨ *Avyavaya* (abstinence from sexual intercourse)
- ⇨ *Divasvapna* (sleeping during day time)
- ⇨ *Harsha Nityatva* (having a state of happiness always)
- ⇨ *Achintana* (lack of mental exercise)
- ⇨ *Bija Svabhava* (genetic defect or hereditary defects)

Ati Sthula Dosha

अतिस्थूलस्य तावदायुषो ह्रासो जवोपरोध कृच्छ्रव्यवायता दौर्बल्यं दौर्गन्ध्यं स्वेदाबाधः क्षुदतिमात्रं पिपासातियोगश्चेति भवन्त्यष्टौ दोषाः। Ca.Su. – 21/4

- ⇨ *Ayusho Hrasa* (shortening of life span)
- ⇨ *Java Uparodha* (deranged movement or sluggish movement)
- ⇨ *Krichra Vyavayata* (difficulty in sexual intercourse)
- ⇨ *Daurbalya* (generalised weakness or fatigue)
- ⇨ *Daurgandhya* (foul smell from the body)
- ⇨ *Svedabadha* (excessive sweating)
- ⇨ *Kshudatimatra* (excessive hunger)
- ⇨ *Pipasa Atiyaga* (excessive thirst)

Pathogenesis of eight Sthula Dosha

Ayusho Hrasa: (shortening of life span)

तस्य ह्यतिमात्रमेदस्विनो मेद एवोपचीयते न तथेतरे धातवः तस्मादायुषो ह्रासः। च.सू. - 21/4

Excess *Meda Dhatu* being nourished in more quantity and other *Dhatu* do not being nourished in appropriate quantity leading to the shortness of life span of the individual.

Javoparodha: (sluggish movement)

शैथिल्यात् सौकुमार्यादगुरुत्वाच्च मेदसो जवोपरोधः। च.सू. - 21/4

Sluggish movement of the body parts will be present due to the looseness, tenderness and heaviness of the *Medo Dhatu.*

Krichra Vyavayata

शुक्रबहुत्वान्मेदसाऽऽवृतमार्गत्वाच्च कृच्छ्रव्यवायता। च.सू. - 21/4

Difficulty in sexual intercourse is due to inadequate semen along with obstruction to the pathway of *Shukra* by *Medo Dhatu.*

Daurbalya

दौर्बल्यमसमत्वाद्धातूनां। च.सू. - 21/4

General debility of an individual is due to inadequate or disproportionate quantity of different *Dhatu* in the body.

Daurgandhya

दौर्गन्ध्यं मेदोदोषान्मेदसः स्वभावात् स्वेदनत्वाच्च। च.सू. - 21/4

Foul smell from the body is due to the inherent defect present in the *Medo Dhatu* and due to the general nature of sweating by the hefty individual.

Kshudatimatra and Pipasatiyoga

तीक्षाग्नित्वात् प्रभूतकोष्ठवायुत्वाच्च क्षुदतिमात्रं पिपासातियोगश्चेति। च.सू. - 21/4

Excessive appetite and thirst is due to enhanced digestive fire along with the abnormal excessive vitiation of *Vata Dosha* in *Koshtha.*

Pathophysiology of obesity:

मेदसाऽऽवृतमार्गत्वाद्वायुः कोष्ठे विशेषतः।
चरन् संधुक्षयत्यग्निमाहारं शोषयत्यपि॥5॥
तस्मात् स शीघ्रं जरयत्याहारं चातिकाङ्क्षति।
विकारांश्चाश्नुते घोरान् कांश्चित्कालव्यतिक्रमात्॥6॥
एतावुपद्रवकरौ विशेषादग्निमारुतौ।
एतौ हि दहतः स्थूलं वनदावो वनं यथा॥7॥
मेदस्यतीव संवृद्धे सहसैवानिलादयः।
विकारान् दारुणान् कृत्वा नाशयन्त्याशु जीवितम्॥8॥
मेदोमांसातिवृद्धत्वाच्चलस्फिगुदरस्तनः।
अयथोपचयोत्साहो नरोऽतिस्थूल उच्यते॥9॥
इति मेदस्विनो दोषा हेतवो रूपमेव च।
निर्दिष्ट, Ca.Su. – 21/5-10

Due to the excessive accumulation of *Meda Dhatu* in the body, normally functioning *Vata* gets vitiated hampering the normal movement of *Vata* in the *Koshtha* leading to the stimulation of digestive fire and absorption of the food. Digestion of consumed food will become very fast due to enhanced *Agni* and thus the person will eat more and more food in quantity. In case of delay in the consumption of food, the person is afflicted with more serious disorders because it digests the *Dhatus*. The *Agni* and *Vata* are the two most trobleshooters and most complicating too and burns the obese individual like the forest fire burning the forest. In the event of excessive increase of Meda and Vata may lead to severe disorders and destroy the life of the individual instantaneously.

Diagnosis of Ati Sthula

- ⇒ Excessive increase of Meda Dhatu and Mamsa Dhatu
- ⇒ Pendulous movement of buttocks, abdomen and breast
- ⇒ Disproportionate relation between the physical strength and physical growth

Ati Krisha (over emaciated person)

Clinical features of Ati Karshya

शुष्कस्फिगुदरग्रीवो धमनीजालसन्ततः।
त्वगस्थिशेषोऽतिकृशः स्थूलपर्वा नरो मतः॥15॥

Ca.Su.–21/15

- ⇒ Muscle wasting in buttocks
- ⇒ Muscle wasting in abdominal region
- ⇒ Muscle wasting in neck region
- ⇒ Prominent vascular marking in the body
- ⇒ Remnants of skin and bones
- ⇒ Prominent joint appearance

Causative factors of Ati Karshya

सेवा रूक्षान्नपानानां लङ्घनं प्रमिताशनम्।
क्रियातियोगः शोकश्च वेगनिद्राविनिग्रहः॥11॥
रूक्षस्योद्वर्तनं स्नानस्याभ्यासः प्रकृतिर्जरा।
विकारानुशयः क्रोधः कुर्वन्ति नरं कृशम्॥12॥

Ca.Su.–21/11-12

- ⇒ *Ruksha Annapana*– excess consumption of food and drinks having *Ruksha* (dry) quality
- ⇒ *Langhana*– measures which are responsible for the lightness of the body
- ⇒ *Pramitashana*– less intake of food or the consumption of food substances having single *Rasa*
- ⇒ *Kriya Atiyoga*– excess exposure to purificatory procedures
- ⇒ *Shoka*– grief
- ⇒ *Vega Nigraha*– suppression of natural urges
- ⇒ *Nidra Nigraha*– suppression of the sleep
- ⇒ *Rukshasya Udvartana*– application of dry or non unctuous substances to the body surface in excess
- ⇒ *Snanasya Abhyasa*– excess indulgence in bath
- ⇒ *Prakriti*– by birth
- ⇒ *Jara*– old age
- ⇒ *Vikara Anushaya*– suffering from chronic disorder
- ⇒ *Krodha*– anger

Lakshana of Ati Krisha Purusha

व्यायाममतिसौहित्यं क्षुत्पिपासामयौषधम्।
कृशो न सहते तद्वदतिशीतोष्णमैथुनम्॥13॥
प्लीहा कासः क्षयः श्वासो गुल्मोऽर्शांस्युदराणि च।
कृशं प्रायोऽभिधावन्ति रोगाश्च ग्रहणीगताः॥14॥

Ca.Su.–21/13-14

- ⇒ The person cannot withstand the after effects of
  - ☐ Physical exercise
  - ☐ Excess consumption of food substances
  - ☐ Hunger
  - ☐ Thirst
  - ☐ Diseases
  - ☐ Moderate or powerful drugs
  - ☐ Excessive cold
  - ☐ Excessive heat
  - ☐ Excess sexual intercourse
- ⇒ *Pliha roga* (disease afflicting the spleen)
- ⇒ *Kasa* (cough)
- ⇒ *Kshaya* (state of *Dhatu* depletion in the body)
- ⇒ *Shvasa* (breathing discomfort)
- ⇒ *Gulma* (chronic abdominal swelling)
- ⇒ *Arshas* (haemorrhoids)

- ⇒ *Udara* (ascites)
- ⇒ *Grahani Roga* (chronic malabsorption syndromes)

Importance of understanding of Ashta Nindita

सततं व्याधितावेतावतिस्थूलकृशौ नरौ।
सततं चोपचर्यौ हि कर्शनैर्बृंहणैरपि॥16॥
स्थौल्यकार्श्ये वरं कार्श्यं समोपकरणौ हि तौ।
यद्युभौ व्याधिरागच्छेत् स्थूलमेवातिपीडयेत्॥17॥

Ca.Su.–21/16-17

- ⇒ The over obese and over emaciated individuals suffer from some diseases and these diseases are to be treated by *Karshana* (measures responsible for depletion of body tissues) and *Brimhana* (measures responsible for nourishment of body tissues) line of treatment respectively.
- ⇒ Out of the two extreme varieties of individual, *Ati Krisha* (too emaciated individual) is better for the management of the diseases when compared to *Ati Sthula* (too stout individual), even though both the individuals need appropriate treatment.
- ⇒ The problem with *Ati Sthula* individual is if these individuals are treated with nourishing therapy, they become more obese and they cannot withstand *Karshana* (body tissue depleting therapy) line of treatment.
- ⇒ On the other hand, *Ati Krisha* individual respond well to *Brimhana* (body nourishing therapy) line of treatment.
- ⇒ These eight individuals do not possess adequate physical strength due to the disproportionate *Dhatu* in the body
- ⇒ The *Samhanana* of the individual and *Pramana* (anthropometric measurement) are abnormal
- ⇒ These eight individuals are considered to be having abnormal hormonal activities in the body

Chapter Resources

1. Charaka Samhita excerpts

Key points of the chapter

- ⇒ This chapter highlights the names of Ashta Nindita who are considered as eight people who are despicable in relation to principles of treatment. The Ashta Nindita are Ati Dirgha (too tall); Ati Hrasva (too short); Ati Loma (too much hairy); Aloma (hairless); Ati Krishna (too dark); Ati Goura (too fair); Ati Sthula (too obese) and Ati Krisha (too emaciated).
- ⇒ Atisthula (obese) and Atikrisha (emaciated) individuals are described in detail.

Probable questions may be asked in the examination

Short essays

- ⇒ Enumerate and explain Ashta Nindita Purusha
- ⇒ Explain in brief about Ashta Nindita Purusha
- ⇒ What is Ashta Nindita and explain Ati Sthula Lakshana
- ⇒ Ati Sthoulya Karana and Lakshana

Short answers

- ⇒ Enumerate Ashta Nindita Purusha
- ⇒ Name Ashta Nindita
- ⇒ Atiloma Ninditiya Purusha
- ⇒ Atiloma and Aloma Purusha

⇨ Ati Sthula Dosha

MCQs

1. **Ayusho Hrasa (reduced life span) is the clinical feature observed in**
   a. Ati Sthula;
   b. Ati Krisha;
   c. Ati Dirgha;
   d. Ati Krishna

   Answer -(a)
2. **Which of the following is incorrect in case of Atisthula person?**
   a. Caused by Avyayama (lack of exercise);
   b. Caused by Bija Svabhava (genetic or hereditary defect);
   c. Daurgandhya (foul smell from the body due to sweating) is seen;
   d. None of the above

   Answer -(d)
3. **Which of the following diseases are usually seen in Ati Krisha (emaciated) individual?**
   a. Pliha (enlarged spleen);
   b. Kasa (cough);
   c. Pipasa (excess thirst);
   d. All of the above

   Answer -(d)
4. **The number of Atisthula Dosha as per Charaka is**
   a. 5;
   b. 6;
   c. 7;
   d. 8

   Answer -(d)
5. **Among Ashta Nindita individuals, who is considered to be managed better when compared to other seven types?**
   a. Atisthula;
   b. Atikrisha;
   c. Atiloma;
   d. Atigoura

   Answer -(b)

***

Definition and Classification of Vyadhikshamatva

10

Learning objectives

- ⇨ To know the definition of Vyadhikshamatva and its extent
- ⇨ To know the types of Vyadhikshamatva

Definition

व्याधिक्षमत्वं व्याधिबलविरोधित्वं व्याध्युत्पादप्रति बन्धकत्वमिति यावत्। Chakra, Ca.Su. – 28/7

It is the strength or power of the body which prevents the manifestation of the disease in an individual who has the features of the disease and resists the onset of the disease if the person is not afflicted with the disease. This is known as *Vyadhi Kshamatva*. In the first instance, the person is afflicted with the manifestation of the disease whereas in the second instance, the person is not afflicted with the disease process. It differs from person to person.

It depends upon the following factors.

1. *Bala*
2. *Prakriti*
3. *Desha*
4. *Kala*
5. *Ojas*

1. ***Bala***: *Vyadhi Kshamatva* depends upon the natural strength of the individual and it is the primary source for the maintenance of health.

बलाधिष्ठानमारोग्यं Ca.Chi. – 3/141

बलवृद्धिकरास्वित्वमे भावा भवन्ति। तद्यथा- बलवत्पुरुषे देशे जन्म बलवत्पुरुषे काले च, सुखश्च कालयोगः, बीजक्षेत्रगुणसंपच्च, आहारसंपच्च, शरीरसंपच्च, सात्म्यसंपच्च, सत्त्वसंपच्च, स्वभावसंसिद्धिश्च, यौवनं च, कर्म च, संहर्षश्चेति॥13॥ Ca.Sha. – 6/13

2. ***Prakriti***: the person with *Vata Prakriti* are usually the frequent sufferers of the disease where as people with *Kaphaja Prakriti* will be having the good health and least suffering from the disease due to the good strength when compared to *Vata Prakriti* individual.
3. ***Desha***: people who reside in *Jangala Desha* are usually afflicted with less disease and the people who reside in *Anupa Desha* are the frequent sufferers of the disease.
4. ***Kala***: As far as the season is concerned, the *Visarga Kala* is said to be responsible for manifestation of many diseases and Adana Kala is considered to be responsible for the manifestation of least diseases. This may be due to the excess heat observed in *Adana Kala*.
5. ***Ojas***: *Bala* is derived from the essence of all seven *Dhatus*. *Ojas* contributes to the maintenance of the health.

Classification of Vyadhikshamatva

त्रिविधं बलमिति- सहजं, कालजं, युक्तिकृतं च।
Ca.Su. – 11/36

As per Charaka, Bala is of 3 types:

⇨ ***Sahaja*** - सहजं यच्छरीरसत्त्वयोः प्राकृतं, It is the inherent *Bala* or strength attained due to the excellence of components of *Sharira* (physique) and *Manas* (mind). This is formed due to the combination of the *Shukra* (sperm) and *Shonita* (ovum) having the excellent qualities.

- ⇨ ***Kalaja*** - **कालकृतमृतुविभागजं वयःकृतं च** this set of strength will be attained by the individual due to the seasonal impact on the human body. This set of strength is also influenced by the age of the individual too.
- ⇨ ***Yuktikrita*** - **युक्तिकृतं पुनस्तद्यदाहारचेष्टा-योगजम्** this set of strength will be gained by an individual by planned implementation of diet, medicines and regimen as prescribed by the physician.

Methods of improving Vyadhi Kshamatva in the individuals

- ⇨ Proper purification therapy (*Shodhana* or *Panchakarma* therapy) before conception
- ⇨ *Masanumasika Paricharya* (diet and regimen to be followed in each month) by pregnant mother
- ⇨ *Shodasha Sanskara* of an individual (16 *Samskara* of an individual commencing from *Garbhadhana* to *Antyeshti Samskara*)
- ⇨ *Nitya Shadrasayukta Ahara* (consumption of food substances having all six *Rasa* daily)
- ⇨ *Nitya Sevana* of *Shali* (rice), *Mudga* (green gram), *Mamsarasa* (meat soup), *Draksha* (grapes), *Amalaki*, *Pippali* (pepper), *Saindhava* (salt), *Ghrita* (ghee), *Kshira* (milk) etc
- ⇨ *Niyamita Vyayama* (regular exercise), non suppression of urges
- ⇨ Following *Dinacharya* (daily regimen), *Ritucharya* (seasonal regimen), *Ratricharya* (regimen to be followed at night), *Sadvritta* (good code of conducts)
- ⇨ Avoiding *Janapadodhvamsakara Nidana* (the factors which lead to destruction of group of people
- ⇨ Respecting and maintaining nature
- ⇨ Periodic *Shodhana* therapy (*Vamana* or emesis in *Vasanta Ritu*; *Virechana* or purgation in *Sharat Ritu* and *Basti* in *Varsha Ritu*) and *Nitya Rasayana* (rejuvenation therapy daily)

Chapter Resources

1. Charaka Samhita excerpts

Key points of the chapter

- ⇨ The meaning of Vyadhi Kshamatva is mentioned in two different contexts – Vyadhibala Virodhitva (body resistance to combat the disease in diseased individual) and Vyadhi Utpadaka Pratibandhakatva (strength of the person to prevent the disease manifestation in healthy individual)
- ⇨ Vyadhi Kshamatva depends on Bala (strength of the individual); Prakriti (constitution of the individual); Desha (residence of the individual); Kala (season of the disease manifestation) and Ojas (essence of all seven Dhatus)
- ⇨ 3 types of Bala are mentioned in Charaka Samhita – Sahaja (inherent strength), Kalaja (strength attained by individual due to seasonal impact) and Yuktikrita (strength attained by a person by planned implementation of diet, medicines and regimen as prescribed by physician).

Probable questions may be asked in the examination

Long essays

- ⇨ Write in detail about the definition and classification of Vyadhikshamatva
- ⇨ Write the Ayurveda and modern concept of Vyadhikshamatva in detail

Short essays

- ⇨ Describe Vyadhi Kshamatva (immunity)

Short answers

- ⇨ Define Vyadhi Kshamatva
- ⇨ Define Vyadhi Kshamatva and Sharira Balavriddhikara Bhava

MCQs

1. **The term Vyadhi Kshamatva includes**
   a. Vyadhibala Virodhitva;
   b. Vyadhi Utpadaka Pratibandhakatva;
   c. Both 1 and 2; None of the above
   Answer -(c)
2. **Types of Bala mentioned by Charaka is**
   a. 3;
   b. 2;
   c. 4;
   d. None of the above
   Answer -(a)
3. **In which season the person will be having maximum strength?**
   a. Adana Kala;
   b. Visarga Kala;
   c. Both 1 and 2;
   d. None of the above
   Answer -(b)
4. **The people of which of the following Desha are frequent sufferers of the disease?**
   a. Jangala Desha;
   b. Sadharana Desha;
   c. Anupa Desha;
   d. All of the above
   Answer -(c)
5. **Bala Vriddhikara Bhavas are mentioned in .... Sthana of Charaka Samhita.**
   a. Vimana;
   b. Sharira;
   c. Sutra;
   d. Chikitsa
   Answer -(b)

***

11

Concept of Ojas and Types of Ojo Dushti

Learning objectives

- Concept of Ojas
- Types of Ojo Dushti

The excellence of all *Dhatu* or the best of all body constituents which are separated to produce a unique element is termed as *Ojas*. *Ojas* provides *Bala* to the individual.

Utpatti of Ojas

तत्र रसादीनां शुक्रान्तानां धातूनां यत्परं तेजस्तत् खलु ओजस्तदेव बलमित्युच्ये स्वशास्त्रसिद्धा Su.Su. – 15/23

- *Ojas* is the pure essence of *Dhatu* from *Rasa* to *Shukra* which is also termed as *Bala*.

ओजस्तु तेजो धातूनां शुक्रान्तानां पर स्मृतम्।

A.Hr.Su. – 11/37

- *Ojas* is the pure essence of all seven *Dhatu*.

परं उत्कृष्टं तेज इव तेजः, तेजो घृतं यथा कृत्स्नक्षीरस्नेहः तथैव ओजोऽपि कृत्स्नधातुस्नेह इत्यर्थः॥

Su.Su. – 15/23, Dalhana

- Ojas is the entity of the body present in the *Dhatu* just like the *Sneha* (butter/ghee) present in milk.

ओजः सोमात्मकं रसादिशुक्रान्तसर्वधातुधामभूत हृदिस्थम्। Su.Su. – 1/29, Dalhana

- *Ojas* is considered to be *Somatmaka* (having cold potency or quality), and the essence of all *Dhatu* from *Rasa* to *Shukra* and its location is *Hridaya*.

Nourishment of ojas

प्राणिनां पुनर्मूलमाहारो बलवर्णौजसां च Su.Su. – 1/29

- Ingested food is the principal factor for the nourishment of strength, complexion and Ojas.

Gunas of Ojas

गुरु शीतं मृदु श्लक्ष्णं बहलं मधुरं स्थिरम्।
प्रसन्नं पिच्छिलं स्निग्धमोजो दशगुणं स्मृतम्॥3 1॥

Ca.Ci. – 24/31

The qualities of Ojas are ten fold

- *Guru* – heaviness
- *Shita* – coldness
- *Mridu* – soft
- *Shlakshna* - smooth
- *Bahala* – thick or dense
- *Madhura* – sweet taste
- *Sthira* – stable or firm
- *Prasanna* - clear
- *Picchila* – slimy
- *Snigdha* – unctuous

हृदि तिष्ठति यच्छुद्धं रक्तमीषत्सपीतकम्।
ओजः शरीरे संख्यातं॥ Ca.Su. – 17/74

- *Ojas* is located in *Hridaya* and it is clear or pure and having the colour of slightly reddish yellow.

प्रथमं जायते ह्योजः शरीरेऽस्मिञ्छरीरिणाम्।
शर्पिर्वर्णे मधुरसं लाजगन्धि प्रजायते॥7 5॥

Ca.Su. – 17/75

- *Ojas* is first formed in the human body at the time of union of *Shukra* and *Shonita*.
- It is having the colour of *Sarpi* (ghee).
- It is having the taste of *Madhu* (honey).
- It is having the smell of *Laja*

Importance of Ojas

दशैवायतनान्याहुः प्राणा येषु प्रतिष्ठिताः।
शङ्खौ मर्मत्रयं कण्ठो रक्तं शुक्रौजसी गुदम्॥3॥

Ca.Su. – 29/3

- There are ten vital parts of the body which will be responsible for the sustenance of life. They are *Shankha* (temporal region on either side), *Marmatraya* (three *Marma* – *Shiras* [head], *Basti* [urinary bladder] and *Hridaya* [heart]), *Kantha* (throat region), *Rakta* (blood), *Shukra* (semen), *Ojas* (essence of all *Dhatu*) and *Guda* (anal region).

ओजः सोमात्मकं स्निग्धं शुक्लं शीतं स्थिरं सरम्॥
विविक्तं मृदु मृत्स्नं च प्राणायतनमुत्तमम्॥2 5॥

Su.Su. – 15/25

- Ojas is *Somatmaka* (cooling substance), Snigdha (unctuous), *Shukla* (whitish colour), *Shita* (cold), *Sthira* (stable or firm), Sara (mobile), *Vivikta* (pure), *Mridu* (soft), *Mritsna* (having the consistency of mud) and is one of the site of vitality.

Classification of Ojas

1. *Para Ojas*
2. *Apara Ojas*

Quantity and location of Ojas

1. *Para Ojas*:

"प्राणाश्रयस्यौजसोऽष्टौ बिन्दवो हृद- याश्रिताः"

Cakra, Ca.Su. – 30/7

The location of *Para Ojas* is *Ashtabindu Pramana* (8 drops) and even minute *Kshaya* (loss) of this type of Ojas can lead to death.

2. *Apara Ojas*:

अर्धाञ्जलिपरिमितःस्यौजसो धमन्य एव हृदयाश्रिताः स्थानम्॥ Cakra, Ca.Su. – 30/7

The quantity of *Apara Ojas* is ½ *Anjali* and its location is *Hridaya* (heart) and its attached vessels.

Functions of Ojas

ओजस्तु तेजो धातूनां शुक्रान्तानां परं स्मृतम्।
हृदयस्थमपि व्यापि देहस्थितिनिबन्धनम्॥3 7॥

A.Hr.Su. – 11/37

- Ojas is the essence of all seven *Dhatu* from *Rasa Dhatu* to *Shukra Dhatu*. It is located in *Hridaya*. It is circulated all over the body and its main function is to maintain the functions of the body.

Ojas Kshaya Hetu

ओजः क्षीयेत कोपक्षुद्ध्यानशोकश्रमादिभिः॥3 9॥

A.Hr.Su. – 11/39

- *Kopa* – anger
- *Kshudha* – hunger
- *Dhyana* – meditation
- *Shoka* – grief
- *Shrama* – physical exertion

वातश्लेष्मक्षये पित्तं देहौजः स्रंसयच्चरेत्।
ग्लानिमिन्द्रियदौर्बल्यं तृष्णां मूर्च्छां क्रियाक्षयम्॥6 0॥

Ca.Su. – 17/60

- When there is diminution of *Vata* and *Kapha Dosha*, there will be *Pitta* vitiation which is responsible for the displacement of Ojas and leading to the clinical features such as *Glani* (exhaustion), *Indriya Daurbalya* (poor functioning of *Indriya* both *Jnanendriya* and *Karmendriya*) , *Trishna* (thirst), *Murcha* (altered consciousness) and *Kriya Kshaya* (diminished or loss of function).

Ojo Dushti Lakshana

Ojo Kshaya as per Vagbhata

बिभेति दुर्बलोऽभीक्ष्ण ध्यायति व्यथितेन्द्रियः।
दुःच्छायो दुर्मना रूक्षो भवेत्क्षामश्च तत्क्षये॥4 0॥

A.Hr.Su. – 11/40

- *Bibheti* – fear
- *Durbala* – weakness
- *Dhyayati* – continuous thinking or worry
- *Vyathita Indriya* – discomfort of sense organs
- *Dushchaya* – loss of lustre
- *Durmana* – cheerlessness

- ⇨ *Ruksha* – dryness
- ⇨ *Kshama* – emaciation

तस्य विस्त्रंसो व्यापत् क्षय इति लिङ्गानि व्यापन्नस्य भवन्ति॥28॥
Su.Su. – 15/28

As per *Sushruta*, the types of *Ojo Dushti* are three types. These are considered as stages rather types of *Ojo Dushti*. They are

1. *Ojo Visramsa*
2. *Ojo Vyapat*
3. *Ojo Kshaya*

Ojo Visramsa

विस्त्रंसः स्थानात् च्युतिरभिघातादिभिरेव।
Dalhana, Su.Su. – 15/28

The term *Visramsa* refers to the displacement from its normal place.

Clinical features observed in Ojo Visramsa

सन्धिविश्लेषो गात्राणां सदनं दोषच्यवनं क्रियासन्निरोधश्च विस्त्रंसे॥
Su.Su. – 15/29

- ⇨ *Sandhi Vishlesha* – looseness of the joints
- ⇨ *Gatranam Sadana* – weakness of the body
- ⇨ *Dosha Chyavana* – displacement of the *Dosha* from their respective seats
- ⇨ *Kriya Sannirodha* – impairment in activities or sluggish behaviour

Ojo Vyapat

व्यापत् अन्यथापत्तिः, सा दुष्टदोषदूष्यसंसर्गात्।
Su.Su. – 15/28

The term *Vyapat* refers to the *Ojas* gets afflicted by vitiated *Dosha* and *Dushya*.

Clinical features observed in Ojo Vyapat

स्तब्धगुरुगात्रता वातशोफो वर्णभेदो ग्लानिस्तन्द्रा निद्रा च व्यापन्ने।
Su.Su. – 15/29

- ⇨ *Stabdha Gatrata* – stiffness in the body parts
- ⇨ *Guru Gatrata* – heaviness in the body parts
- ⇨ *Vata Shophata* – swelling in the body due to the vitiation of *Vata*
- ⇨ *Varnabheda* – *Discolouration* or loss of complexion
- ⇨ *Glani* – exhaustion
- ⇨ *Tandra* – drowsiness
- ⇨ *Nidra* – excessive sleep

Ojo Kshaya

क्षयः स्वप्रमाणात् शोकध्यानक्षयादिभिः।
Dalhana, Su.Su. – 15/28

The term *Kshaya* refers to decrease in its quantity.

मूर्च्छा मांसक्षयो मोहःप्रलापो मंरणमिति च क्षये॥
Su.Su. – 15/29

- ⇨ *Murcha* – altered state of consciousness
- ⇨ *Mamsa Kshaya* – wasting of the muscles
- ⇨ *Moha* – confusion
- ⇨ *Pralapa* – excess irrelevant speech
- ⇨ *Marana* – death

प्राकृतस्तु बलं श्लेष्मा विकृतो मल उच्यते।
स चैवौजः स्मृतः काये स च पाप्मोपदिश्यते॥117॥
Ca.Su. – 17/117

Shleshma in its normalcy promotes *Bala* (strength) and is called *Ojas*. When it becomes abnormal, it takes the form of *Mala* and causes many diseases. In this occasion, Ojas is having the qualities of *Kapha* and it is nothing but *Apara Ojas* i.e. of ½ *Anjali Pramana*. In the above context, *Bala* and *Ojas* are used synonymously for normal *Kapha*.

Conclusion

- ⇨ *Ojas* is the essence of all seven *Dhatus*, therefore it provides the natural resistance to the body to fight against disease, degeneration and decay of the body.
- ⇨ The individual constitution like *Prakriti*, *Ahara*, *Vihara*, *Manas* differ from person to person hence, *Ojas* also varies. Therefore every individual is not equally capable of combating with the disease due to varying degrees of strength to oppose the manifestation of the disease.

- ⇨ Every disease is due to the result of the Ojo *Kshaya* in varying proportions.
- ⇨ The concept of Ojas can be contributed to the concept of *Vyadhikshamatva*. Hence, its fluctuation can lead to manifestation of various diseases in the body.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya and Ashtanga Sangraha excerpts

Key points of the chapter

- ⇨ Concept of Ojas is described in this chapter regarding its formation, qualities, characters, functions, types and importance of Ojas
- ⇨ Causes of abnormal Ojas formation in the body; the clinical features observed in case of abnormal Ojas and three types of Ojas Kshaya – Visramsa, Vyapat and Kshaya as per Sushruta is described elaborately.

Probable questions may be asked in the examination

Short essays

- ⇨ Ojo Vriddhi and Kshaya Lakshana
- ⇨ Explain the stages of Ojo Kshaya as per Sushruta
- ⇨ Ojo Dushti

Short answers

- ⇨ Ojas
- ⇨ Write Ojas Kshaya Lakshana
- ⇨ Ojo Vyapat
- ⇨ Ojo Visramsa and Ojo Kshaya
- ⇨ Classification of immunity
- ⇨ Ojas Kshaya
- ⇨ Ojo Dushti Lakshana
- ⇨ Ojo Visramsa

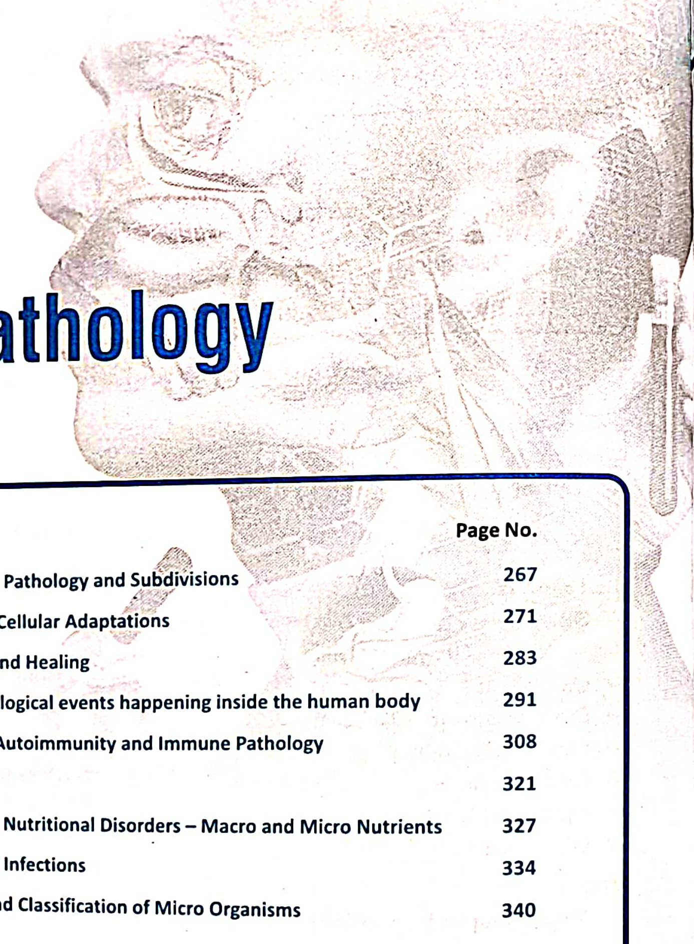
MCQs

1. **Vataja Shopha is specifically seen in**
   a. Ojo Visramsa;
   b. Ojo Vyapat;
   c. Ojo Kshaya;
   d. All of the above
   Answer -(b)
2. **Sandhi Vishlesha (looseness of the joints) is seen in**
   a. Ojo Visramsa;
   b. Ojo Vyapat;
   c. Ojo Kshaya;
   d. All of the above
   Answer -(a)
3. **Types of Ojas mentioned in Ayurveda literatures are**
   a. One;
   b. Two;
   c. Three;
   d. Four
   Answer -(b)
4. **Which of the following is not the Guna of Ojas?**
   a. Ushna;
   b. Sthira;
   c. Snigdha;
   d. Guru
   Answer -(a)
5. **The quantity of Apara Ojas is**
   a. 8 Bindu;
   b. ½ Anjali;
   c. 1 Anjali;
   d. 2 Anjali
   Answer -(b)

***

SECTION - III

Basic Pathology



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With G.K.'s Opinion

Introduction To Pathology and Subdivisions

1

Learning objectives

- ⇨ To know the definition of pathology
- ⇨ To know the difference between disease and illness
- ⇨ To know the different terminologies used in pathology
- ⇨ To know the different subdivisions of pathology

The word 'pathology'¹comprises of two Greek words – pathos meaning suffering and logos refers to study. Pathology is thus defined as the science which deals with the study of diseases. It means the demographic details of the disease, etiology, pathophysiology, clinical features, prognosis of diseases. To simplify the definition, it deals with the abnormalities of the body in terms of its structure and function. The knowledge of the pathology helps all health care professionals to know the causes of the illness, mechanism of the illness, nature and type of the disease and to predict the prognosis of the disease.

Pathology has evolved over the years as a distinct discipline from other branches– anatomy, medicine and surgery, in that sequence. After having emerged as a laboratory phase of medicine (and surgery), pathology is now confined to laboratories alone, particularly in the fields such as aspiration cytology, haematology.

Health and disease: health and disease are relative terms. That means it is difficult to define the terms with precision. In simple language, the term disease is opposite to health (dis-ease), that means who is not healthy, he is diseased. Health is a condition when the individual is in complete accord with the surroundings, while the disease is loss of ease to the body. However, it should be remembered that even in health, there are wide range of variations e.g. height, weight, composition of blood, tissue chemical composition etc. For example, if the weight of the individual is more than 80 kg with a height of 5 feet is considered to be abnormal and same weight with a height of 6 feet could be normal.

A term commonly confused with disease is illness. While the disease is suggests an entity with a cause, illness is the reaction of the individual to the disease with clinical features in the form of symptoms and signs. These clinical features are highly variable in different individuals owing to individual differences in reaction to the disease.

Thus, the study of the diseases is done in pathology and learning the illnesses is done in wards and clinics.

G K

1 To understand the exact pathology of any disease, we need to understand the physiology of human body well. If you know information on human physiology well, we can understand the human pathology well. If we know the pathology well, the learning the clinical medicine is very easy. The same thing is applied in case of *Ayurveda* too. If one knows the *Kriya Sharira* well, he can very well understand the concepts of *Roga Nidana* well and if one knows the concepts of *Roga Nidana*, then he can very well understand the fundamentals of *Kayachikitsa*.

⇨ If the wise clinician in *Ayurveda* wants to excel in the field of management of the disease, he should know the fundamentals of *Rachana Sharira, Kriya Sharira, Roga Nidana, Dravyaguna Vigyana, Rasa Shastra* and *Bhaishajya Kalpana Vigyana* and *Panchakarma Vigyana* well.

Syndromes (meaning running together) are characterised by combination of symptoms caused by altered physiological processes.

Terminologies used in pathology

- ⇨ **Patient**– the person or individual suffering from disease, some of the physicians use the term client for the patient
- ⇨ **Lesions**– characteristic changes in tissues or cells produced by the disease in an individual or experimental animal, e.g. skin lesions in the person suffering any dermatological illness
- ⇨ Pathologic changes or morphology – examination of diseased tissues can be observed by naked eye (gross or macroscopic changes) and by observing under microscope (microscopic changes)
- ⇨ **Causal factors**– the factors responsible for the manifestation of the disease (why of the disease) for example, traumatic (presenting complaint occurring due to physical trauma such as low back pain or loss of strength of lower limb following trauma); infective (presence of fever following entry of microorganism into the body); neoplastic (presenting complaint related to system wherein progression of the illness occurs within short duration i.e. within weeks to months); idiopathic (where in cause of the disease cannot be traced).
- ⇨ **Pathogenesis of the disease**– mechanisms by which the diseases are produced (how of the disease) for example, ischemia (where in reduced blood supply to the afflicted part occurs presented with worsening of the symptoms on exertion); inflammation (where in pain, swelling, redness and local raise of temperature are observed); congenital (where in the presenting complaints are observed since birth).
- ⇨ **Symptoms**– the complaints felt by the patient for example, chest pain, abdominal pain, loss of strength in limbs of one side, headache, deafness, dysphagia, loss of appetite, burning micturition etc.
- ⇨ **Signs**– the clinical abnormalities elicited by the clinicians for example, tachycardia (increased pulse rate), clubbing, tenderness, hepatomegaly, crepitations on auscultation of the lungs, crepitus on palpation of the knee joint, localising the apex impulse, palpation of peripheral arterial pulsations etc.
- ⇨ Clinical significance of anatomical and physiological changes along with investigations help the clinicians to find the answer what is wrong (diagnosis); what is going to happen (prognosis), what can be done to the patient at that particular time (treatment), what can be done to avoid the further worsening into the development of complications and spread(prevention).
  - ☐ Let us learn this concept with the help of one example. Let us take the example of functional anatomy of oesophagus. Oesophagus is a tubular structure connects between pharynx and stomach. Functions of the oesophagus are as follow:
  - ☐ Transport of the masticated food from mouth to stomach within seconds. This may be disturbed in the patient suffering from carcinoma of oesophagus or cardiospasm where the person will be presented with dysphagia
  - ☐ Prevention of entry of the food into respiratory passages via upper oesophageal sphincter which may lead to aspiration pneumonia where in the person will be presented with abrupt onset of cough.
  - ☐ Prevention of reverse movement of food present in the stomach into the oesophagus via lower oesophageal sphincter. This may be disturbed in hiatus hernia or cardiospasm or reflux oesophagitis where in the person may be presented with burning sensation in the epigastrium or retrosternal region, sour eructation, dysphagia, regurgitation etc.
  - ☐ Secretion of adequate amount of mucus to prevent the damage to oesophageal mucosa leading to oesophageal ulcer or carcinoma of oesophagus where in the person may be presented with burning sensation in the epigastrium or sour eructations or dysphagia.
  - ☐ Thus, we have to categorise the structure and function and pathophysiology of each and every organ of the system.

Subdivisions of the pathology

Human pathology is the largest branch of pathology. It is conveniently divided into general pathology and systemic pathology. General pathology deals with the general principles of the disease and systemic pathology deals with the study of the diseases of particular organs or organ systems and their effects on the body. With the advancement of diagnostic tools, the specialty of the pathology has been divided into following subspecialties.

1. **Histopathology: Histopathology has different synonyms** – anatomic pathology, pathologic anatomy or morbid anatomy. The study includes macroscopic changes and microscopic changes. Macroscopic changes can be identified by naked eye examination of the specimen. Whereas the microscopic changes can be identified by either light microscope or electron microscope. Modern time pathology includes super specialties such as cardiac pathology, pulmonary pathology, renal pathology, gynaecological pathology, oral pathology and so on. Anatomic pathology includes 3 following subheadings:
   - ⇨ **Surgical pathology:** deals with the study of tissues removed from the living body. It forms the bulk of the tissue material for the pathologist and includes the study of tissue by paraffin embedding techniques and by frozen section for rapid diagnosis.
   - ⇨ **Forensic pathology and autopsy work:** deals with the study of tissues and organs removed from dead body at post mortem for medico legal purposes and to determine the probable cause of the death. This is helpful for the clinician to broaden his knowledge regarding the disease.
   - ⇨ **Cytopathology:** It includes the study of cells shed off from the lesions (exfoliative cytology) and fine needle aspiration cytology (FNAC) of superficial and deep seated lesions for the diagnosis.
2. **Haematology:** Haematology deals with the diseases of the blood. It includes laboratory haematology and clinical haematology. Clinical haematology deals with the management of the patient also.
3. **Chemical pathology:** analysis of biochemical constituents of blood, urine, semen, CSF and other body fluids is included in this branch of pathology.
4. **Immunology:** detection of abnormalities in the immune system of the body. It comprises immunology and immunopathology.
5. **Experimental pathology:** This is defined as the production of the disease in the experimental animal and the study of the diseases in these experimental animals. All the findings obtained in these experimental animals cannot be generalised to the human beings.
6. **Geographic pathology:** The study of differences in distribution of frequency and type of diseases in populations in different parts of the world. This is helpful in analysing the demographic details of any disease of any part of the world.
7. **Medical genetics:** This branch of human genetics helps in studying the relationship between heredity and disease. For example, blood groups, inborn errors of metabolism, chromosomal aberrations in congenital anomalies and in neoplasms.

8. **Molecular pathology:** The detection and diagnosis of abnormalities at the level of DNA of the cell is included in molecular pathology.

Chapter Resources

1. Textbook of pathology by Harsha Mohan, 5th edition, Jaypee brothers publication, New Delhi, 2005
2. Savil's system of clinical medicine, revised and edited by E C Warner, 14th edition, CBS Publishers, 1988

Key points of the chapter

⇨ Definition of pathology, divisions of pathology is being described in brief.

⇨ Certain terminologies such as health and disease, patient, lesions, causal factors, pathogenesis of the disease, symptoms and signs is mentioned in the present chapter.

Probable questions may be asked in the examination

Short essays

⇨ What is pathology? Explain in brief various divisions of pathology

Short answers

⇨ What is pathology?

⇨ Define pathology

⇨ Write various divisions of human pathology

⇨ Define disease

⇨ What do you mean by sign and symptom and explain in brief with suitable examples

MCQs

1. **The word pathology is indicative of study of**
   a. Diseases;
   b. Health;
   c. Treatment;
   d. Medication

   Answer -(a)

2. **Which of the following is not considered as sign?**
   a. Dysphagia;
   b. Clubbing;
   c. Tenderness;
   d. Localisation of apex impulse

   Answer -(a)

3. **The term hematology refers to the study of**
   a. Liver;
   b. Blood;
   c. Urine;
   d. Serum

   Answer -(b)

4. **Find the one which does not belong to the group**
   a. Headache;
   b. Chest discomfort;
   c. Loose stools;
   d. Cyanosis

   Answer -(d)

5. **Find the one which does not belong to the group**
   a. Hepatomegaly;
   b. Radial pulsation assessment;
   c. Crepitus on palpation of knee joint;
   d. Loss of appetite

   Answer -(d)

***

Cell Injury and Cellular Adaptations

2

Learning objectives

⇨ To know the definitions of cell injury and cellular adaptations

⇨ To know the brief description of genetic causes of cell injury

⇨ To know the brief description of acquired causes of cell injury

⇨ To know the pathology of reversible and irreversible cell injury

⇨ To know the cellular adaptations, their current understanding

Cell is considered to be structural and functional unit of living beings. Based on the number of cells, living organisms are categorised into unicellular and multicellular organisms. Unicellular organisms perform all the activities of life whereas in multicellular organisms, each group of cells assigned specialised functions. These cells function in such a way that hormony of the organisms will be maintained. Human being is one such complex multicellular organism made up of about 70,000 billion cells. Most of the diseases begin with cell injury and thereby abnormal functions of these injured cells.

Cell injury is defined as a variety of stresses a cell encounters as a result of changes in its internal and external environment. All the cells of the body have inbuilt mechanisms to deal with changes in environment to a certain extent. These injuries depend upon

⇨ The type of cell and tissue involved.

⇨ Extent and type of injury.

For example, when a person is diagnosed to be suffering from stable myocardial infarction, he may be having the fibrosis of the infarcted tissue in the heart which is limiting the function of myocardial cell. In case of exposure to repeated X ray by an individual, there is the possibility of injury in the nucleus of the cell leading to genetic mutation.

Cellular responses to injury may as follow

1. When there is increase functional demand, the cell may adapt to the changes which are expressed morphologically and then revert back to normal after the stress is removed. This type of mechanism is called cellular adaptation.
2. When the stress is mild to moderate, the injured cell may recover (reversible cell injury) and when the injury is persistent then the cell may die (irreversible cell injury).
3. The residual effects of reversible cell injury may persist in the cell as evidence of cell injury is at subcellular level (subcellular changes) or metabolites may accumulate within the cell (intracellular accumulations).

Causes of cell injury:

⇨ **Genetic causes**– causes are those where structural defects in the genes are seen.

⇨ **Acquired causes**– causes which are responsible for cell injury where the person is exposed after birth.

Genetic causes

1. Developmental defects.
2. Cytogenetic (karyotypic) defects.

3. Single gene defects (Mendelian disorders).
4. Multifactorial inheritance disorders.
5. Storage diseases (inborn errors of metabolism).

1. **Developmental defects–** are group of abnormalities during fetal life due to errors in morphogenesis. These are caused by exposure to certain chemicals, drugs, physical and biological agents. These are called as teratogens. The morphological abnormality or defect of an organ or defect of an organ is called malformation. These will lead to.
   - ⇨ **Agenesis–** complete absence of an organ such as solitary kidney
   - ⇨ **Aplasia–** absence of development of an organ with presence of rudiment e.g. aplasia of lung with rudimentary bronchus
   - ⇨ **Hypoplasia –** incomplete development of an organ not reaching the normal adult size such as macroglossia (small sized tongue)
   - ⇨ **Atresia –** incomplete formation of lumen in the hollow viscus such as oesophageal atresia.
   - ⇨ **Fetal alcohol syndrome–** consumption of ethanol in the first trimester of pregnancy increases the risk of growth retardation or mental retardation of the new born.
2. **Cytogenetic abnormalities:** Human germ cells (sperm and ovum) contain 23 chromosomes and mature human cell contains 46 chromosomes. Among 46 chromosomes, 22 pairs are considered as autosomes and 1 pair is considered as allosomes. Among the allosomes, in case of females, XX chromosomes are present and in case of males XY chromosomes are present in the nucleus. As far as cytogenetic abnormalities are concerned, two types of abnormalities are observed.
   - ⇨ **Numerical abnormalities–** where normal diploid (2N) nature of human cell is not maintained it may be either polyploid or aneuploid .
     - ☐ The term **polyploid** refers to the number of chromosomes which is a multiple of haploid – triploid 3N (69 chromosomes) or tetraploid (96 chromosomes). This mechanism can occur in megakaryocytes and dividing liver cells
     - ☐ **Aneuploid** is the number of cells not an exact multiple of haploid number i.e. hypodiploid (2N-1 – 45 chromosomes) termed as monosomy and hyperdiploid (2N+1 – 47 chromosomes) termed as trisomy. For example, Down's syndrome where trisomy is observed in 21st chromosome; Klinefelter's syndrome[1] where trisomy of sex chromosome is seen (XXY karyotype with 47 chromosome); Turner's syndrome sex chromosome monosomy wherein XO is the karyotype.
   - ⇨ **Structural abnormalities–** where structural defects are seen in chromosomes for example, structural change observed in Turner's syndrome.
3. **Single gene defects–** these can occur as a result of mutation of a single gene of a large effect. Certain examples of this category of defects are sickle cell anemia, Wilson's disease, alkaptonuria, hereditary spherocytosis, osteogenesis imperfecta, diabetes incipidus, colour blindness, G6PD deficiency, muscular dystrophies.
4. **Disorders with multifactorial inheritance–** these are disorders which result from combined effect of genetic composition and environmental influences. Some normal phenotypic characters have also have multifactorial inheritance e.g. colour of hair, eye, skin, height and intelligence. Certain examples of disorders of this category are
   - ⇨ Cleft lip and cleft palate.
   - ⇨ Pyloric stenosis.
   - ⇨ Diabetes mellitus.
   - ⇨ Hypertension.
   - ⇨ Congenital heart disease.
5. **Inborn errors of metabolism –** in this category of diseases occurring due to genetic defect in the metabolism of carbohydrates, lipids and proteins leading to the accumulation of metabolites inside the cell. In other words to say, intracellular accumulation of the metabolites. E.g. glycogen storage diseases where defective glucose metabolism leading to excessive intracellular accumulation of glycogen in various tissues.

Acquired causes

1. Hypoxia and ischemia.
2. Physical agents.
3. Chemical agents and drugs.
4. Microbial agents.
5. Immunological agents.
6. Nutritional derangements.
7. Psychological factors.

Hypoxia and ischemia

- ⇨ All tissues require oxygen to generate energy to perform metabolic functions of the cell. Deficiency of oxygen leads to failure to carry out these metabolic activities by the cell.
- ⇨ Hypoxia is considered to be the most common cause of cell injury. Ischemia (lack of blood supply) is considered to be the most common cause of hypoxia.
- ⇨ Other causes responsible for hypoxia include anemia, carbon monoxide poisoning, cardiopulmonary insufficiency and increased demand of the tissues.

Physical agents

- ⇨ Mechanical trauma (road traffic accidents).
- ⇨ Thermal trauma (e.g. by heat and cold).
- ⇨ Electricity.
- ⇨ Radiation (ultraviolet and ionising).
- ⇨ Rapid changes in atmospheric pressure.

Chemical agents and drugs:

- ⇨ Chemical poisons such as cyanide, arsenic, mercury.
- ⇨ Strong acids and alkalis.
- ⇨ Environmental pollutants.
- ⇨ Insecticides and pesticides.
- ⇨ Oxygen at high concentrations.
- ⇨ Hypertonic glucose and salt.
- ⇨ Social agents such as alcohol and narcotic drugs.
- ⇨ Therapeutic administration of the drugs.

Microbial agents injuries caused by

- ⇨ Bacteria.
- ⇨ Viruses.
- ⇨ Fungi.
- ⇨ Protozoa.
- ⇨ Rickettsiae.
- ⇨ Metazoa.
- ⇨ Other parasites.

Immunological agents

- ⇨ Hypersensitivity reactions.
- ⇨ Anaphylactic reactions.
- ⇨ Autoimmune diseases.

Nutritional derangements

- ⇨ Nutritional deficiency diseases such as starvation (overall deficiency of nutrients), protein energy malnutrition (marasmus, kwashiorkor), minerals (anemia) or trace elements.
- ⇨ Nutritional excess such as obesity,

GK [1] Klinefelter's syndrome is a male person with testicular agenesis and Turner's syndrome is a female person atherosclerosis, heart disease, hypertension.

Psychological factors

- ⇨ There are no specific biochemical or morphological changes in commonly acquired mental diseases due to mental stress, strain, anxiety, overwork and frustration e.g. depression and schizophrenia.
- ⇨ Problems of drug addiction, alcoholism and smoking result in various changes in the cellular metabolism such as liver damage, chronic bronchitis, lung cancer, peptic ulcer, hypertension, ischemic heart disease etc.

Pathogenesis of cell injury: depends on

1. **Type, duration and severity of injurious agent:** The extent of cell injury depends upon type, duration and severity of the stimulus of injurious agent e.g. small dose of chemical toxin or short duration of ischemia cause reversible injury while large dose of chemical toxin or long duration of ischemia will lead to irreversible injury or sometimes death.
2. **Type, status and adaptability of target cell:** The nutritional and metabolic status of the cell to hostile environment determine the extent of injury of the cell e.g. skeletal muscle can withstand hypoxic injury for long time while cardiac muscle will show irreversible injury after 30-60 minutes of persistent ischemia.
3. **Underlying intracellular phenomena:** Two essential phenomena of the cell will determine the reversible and irreversible cell injury are
    - ⇨ Inability to reverst mitochondrial dysfunction by reperfusion or reoxygenation.
    - ⇨ Disturbance in membrane function in general, in plasma membrane in particular.
4. **Morphologic consequences:** can be observed in the form of hydropic degeneration (intracellular swelling) or damage to the endoplasmic reticulum etc.

Let us take the example of ischemic cause for the description of reversible and irreversible injury:

Reversible cell injury: this type of cell injury will occur in case of ischemia or hypoxia of short duration and on restoration of circulation, there will be recovery from the cell injury. The changes observed are

1. **Decreased generation of ATP:** ATP[2] is required for many cellular functions such as membrane transport, protein synthesis, lipid synthesis and phospholipid metabolism.
2. **Reduced intracellular pH:** Due to low oxygen in the cell, failure of aerobic respiration in mitochondria occurs leading to rapid depletion of glycogen due to the initiation of anaerobic respiration and thereby there will be accumulation of lactic acid lowering the pH of intracellular compartment. This is responsible for clumping of nuclear chromatin.
3. **Damage to plasma membrane sodium pump:** Lowered ATP in the cell and consequent increase of ATPase activity interfere with membrane regulated process thereby leading to the accumulation of sodium ions inside the cell and potassium ions outside the cell. This leads to the accumulation of water inside the cell.
4. **Reduced protein synthesis:** Ribosomes are detached from granulated endoplasmic reticulum; polysomes are reduced to monosomes.
5. Functional consequences: e.g. myocardial contractility ceases within 60 seconds of coronary occlusion, but can be reversed if the circulation is restored.
6. **Ultrastructural changes:**

- ⇨ **Endoplasmic reticulum:** Distension of cisternae by fluid and detachment of membrane bound polyribosomes from the surface of rough endoplasmic reticulum.
- ⇨ **Mitochondria:** Mitochondrial swelling and phospholipid rich amorphous densities.
- ⇨ **Plasma membrane:** Loss of microvilli and focal projections of the cytoplasm
- ⇨ **Myelin figures:** These structures are lying in the cytoplasm or present outside the cell. They are derived from membranes (plasma membrane or organellar membrane) enclosing water and dissociated lipoproteins between the lamellae of injured membranes
- ⇨ **Nucleolus:** There is segregation of granular and fibrillar components of nucleolus and reduced synthesis of ribosomal RNA

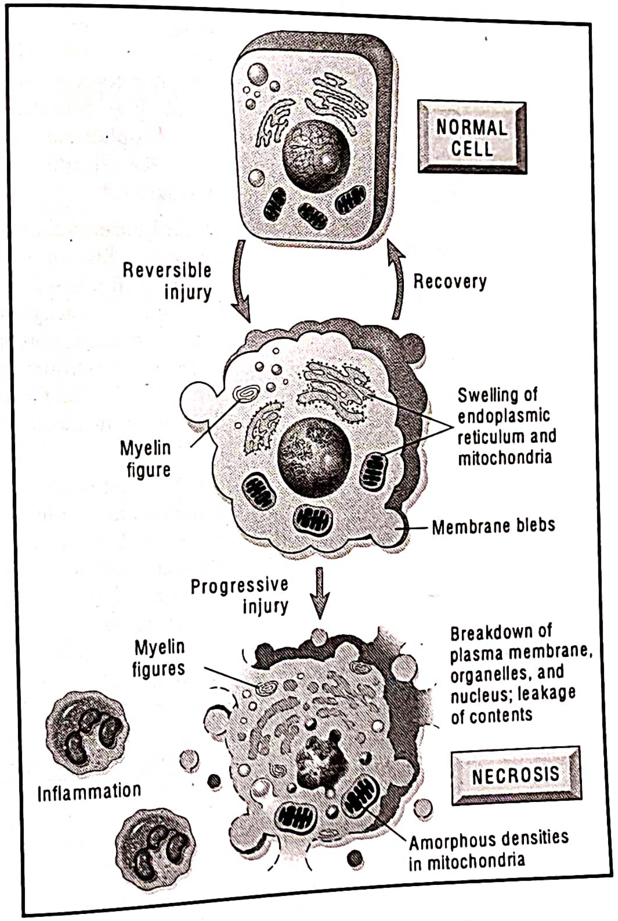
NORMAL CELL
Reversible injury
Recovery
Myelin figure
Swelling of endoplasmic reticulum and mitochondria
Membrane blebs
Progressive injury
Myelin figures
Breakdown of plasma membrane, organelles, and nucleus; leakage of contents
NECROSIS
Inflammation
Amorphous densities in mitochondria

Fig 2.1: Reversible and Irreversible cell injury

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[2] ATP in human cell is generated from two sources
1. By aerobic respiration in mitochondria
2. By anaerobic respiration in the absence of oxygen, ATP is generated from glucose/ glycogen

Irreversible cell injury: Persistence of ischemia or hypoxia results in irreversible cell injury. Two essential phenomena distinguish this stage from reversible cell injury.

- ⇨ Inability of the cell to reverse mitochondrial functionon reperfusion of reoxygenation
- ⇨ Disturbance in cell membrane function in general, plasma membrane in particular.

1. **Mitochondrial dysfunction:** Due to continuous hypoxia, there will be large influx of Calcium ions especially after reperfusion of the irreversibly injured cell, which is taken up by the mitochondria. Morphologically, vacuoles in the mitochondria are seen in irreversible cell injury.
2. **Membrane damage:** Damage to the plasma membrane is observed where in
   - ❑ Accelerated degradation of membrane phospholipid. Oxygen deprivation leads to shift of calcium ions from mitochondria and endoplasmic reticulum to the cytosol. Enhanced calcium ions activates endogenous phospholipases from ischemic tissue leads to the progressive degradation of phospholipid.
   - ❑ Cytoskeletal damage: Normal intermediate filaments of cytoskeleton attached to cell membrane are damaged due to degradation by intracellular proteases or by physical effect of cellular swelling.
   - ❑ Toxic oxygen radicals: Reactive oxygen derived species – superoxide, hydrogen peroxide and hydroxyl radicals (free radicals)[3] are increased in ischemia. These are generated within mitochondrial inner membrane. These oxygen radicals are produced during reperfusion by incoming polymorphs. Cell death occurs due to free radical reactions because any of the following mechanisms namely, lipid peroxidation, protein oxidation, DNA damage or cytoskeletal damage.
   - ❑ Break down products of lipid: These products are accumulated inside the cell.
   - ❑ Reperfusion damage: Normally, concentration of calcium ions are less inside the cell than outside the cell. During reperfusion of irreversible cell injury, calcium homeostasis will be reversed leading to the excess accumulation of calcium ions inside the cell. This calcium ions are responsible for activation of membrane phospholipases leading to phospholipid degeneration or proteases leading to membrane damage.
3. **Hydrolytic enzymes:** Due to lysosomal damage, liberation of hydrolytic enzymes (RNAase, DNAase, protease, glycosidase, phosphatase, cathepsin) which on activation cause enzymatic digestion of cellumar components and induce the nuclear changes (pyknosis, karyolysis and karyorrhexis) and hence cell death.
4. **Serum estimation of liberated intracellular enzymes:** e.g. in case of myocardial infarction, estimation of elevated serum glutamic oxaloacetic transaminase (SGOT), lactic dehydrogenase (LDH), isoenzyme of creatinine kinase (CK-MB) are the useful guides of assessment of cardiac damage.

Cellular Adaptations

For the sake of survival on exposure to stress, the cells make adjustments with the changes in their environment to physiologic needs (physiological adaptations) and to non lethal pathological injury (pathological adaptations).

Such adaptations can occur due to following processes:

- ⇨ Decreasing or increasing their size i.e. atrophy and hypertrophy respectively or by increasing in the number hyperplasia.
- ⇨ By changing the pathway of phenotypic differentiation of the cells i.e. metaplasia and dysplasia.

Atrophy:

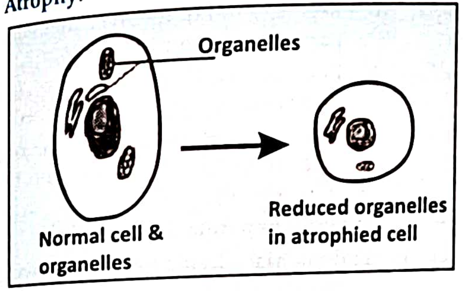

Fig 2.2: Atrophy

Reduction in the number of the cells and size of the parenchymal cells of an organ or its parts which was once normal is called atrophy.

Causes: Atrophy may occur from physiological and pathological causes.

- ⇨ **Physiological atrophy:** Atrophy is the normal process of aging in some tissue which could be due to loss of endocrine stimulation or arteriosclerosis.
  - ❑ Atrophy of lymphoid tissue in lymph nodes, appendix and thymus
  - ❑ Atrophy of the gonads after menopause
  - ❑ Atrophy of the brain
- ⇨ **Pathological atrophy:**
  - ❑ **Starvation atrophy:** in starvation, there is first depletion of carbohydrate and fat stores followed by protein catabolism. There is general weakness, emaciation and anemia referred to as cachexia seen in cancer and severely ill patients.
  - ❑ **Ischemic atrophy:** Gradual diminution of blood supply due to atherosclerosis may result in shrinkage of affected organ
    - Small atrophic kidney in atherosclerosis of renal artery
    - Atrophy of brain in cerebral atherosclerosis
- ⇨ **Disuse atrophy:** Prolonged diminished functional activity is the probable cause in this type of atrophy.
  - ❑ Wasting of muscles of limbs immobilised in cast
  - ❑ Atrophy of pancreas in obstruction of pancreatic duct.
- ⇨ Neuropathic atrophy: The cause is interruption in nerve supply
  - ❑ Poliomyelitis
  - ❑ Motor neuron disease
  - ❑ Nerve section
- ⇨ **Endocrine atrophy:** Loss of endocrine regulatory mechanism is the probable cause of this type of atrophy.
  - ❑ Hypopituitarism leading to the atrophy of thyroid, adrenals and gonads
  - ❑ Hypothyroidism causing atrophy of the skin and its adnexal structures
- ⇨ **Pressure atrophy:** Prolonged pressure from benign tumours or cysts or aneurysm may lead to this type of atrophy.
  - ❑ Erosion of spine by tumour in the nerve root
  - ❑ Erosion of the skull by meningioma arising from pia-arachnoid mater
  - ❑ Erosion of the sternum by aneurysm of aorta
- ⇨ Idiopathic atrophy: no obvious cause can be identified
  - ❑ Myopathies
  - ❑ Testicular atrophy

Hypertrophy

The term hypertrophy refers to an increase in the size of the parenchymal cells resulting in enlargement of the tissue or organ without any change in the number of the cells.

GK [3] Free radical injury is operating in radiation injury, chemical injury, microbial killing, aging, atherosclerosis, carcinogenesis

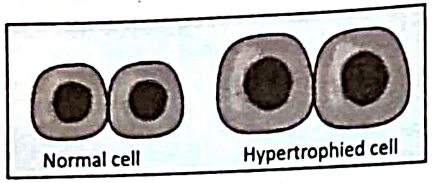

Fig 2.3: Hypertrophy

Causes: may be physiologic or pathologic. In both cases, it occurs due to raise in functional demand or by hormonal stimulation.

- ⇨ **Physiological hypertrophy:** Enlarged size of uterus in pregnancy is a perfect example of physiologic hypertrophy as well as hyperplasia.
- ⇨ **Pathological hypertrophy:**
  - ☐ **Hypertrophy of cardiac muscles:** in systemic hypertension, aortic valvular disease, mitral insufficiency
  - ☐ **Hypertrophy of smooth muscles:**
    1. Achalasia cardia (oesophagus)
    2. Pyloric stenosis (stomach)
    3. Intestinal strictures
    4. Muscular arteries in hypertension
  - ☐ **Hypertrophy of skeletal muscles:** especially seen in athletes and manual labourers
  - ☐ **Compensatory hypertrophy:** may be seen in an organ when the contralateral organ is removed or non functional. E.g. in case of removal of lung or kidney, the other lung or kidney will be having enhanced functions of the other organ too. This will lead to the hypertrophy of the other organ.

Hyperplasia

The term hyperplasia is an increase in the number of the parenchymal cells resulting in an enlargement of the organ or tissue. Quite often, hyperplasia occurs along with hypertrophy.

Causes: may be physiologic or pathologic.

- ⇨ **Physiological hyperplasia may be of two types** – hormonal and compensatory.
  - **(a) Hormonal hyperplasia:**
    1. Hyperplasia of the female breast at puberty, during pregnancy and lactation
    2. Hyperplasia of the pregnant uterus
    3. Proliferative activity of normal endometrium after a normal menstrual cycle
    4. Prostatic hyperplasia in old age
  - **(b) Compensatory hyperplasia:**
    1. Regeneration of the liver following partial hepatectomy
    2. Regeneration of the epidermis after skin abrasion
    3. Following nephrectomy on one side, there is hyperplasia of the other kidney
- ⇨ **Pathological hyperplasia:**
  1. Endometrial hyperplasia following oestrogen excess
  2. In wound healing, formation of granulation tissue due to proliferation of fibroblasts and endothelial cells
  3. Formation of skin warts from hyperplasia of epidermis due to human papilloma virus
  4. Pseudocarcinomatous hyperplasia of the skin
  5. Intraductal epithelial hyperplasia in the breast in fibrocystic breast disease.

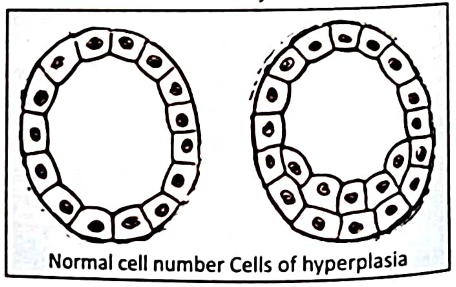

Fig 2.4: Hyperplasia

Metaplasia

Meta (transformation) and plasia (growth). Thus, the term metaplasia is defined as a reversible change of one type of epithelial or mesenchymal adult cells to another type of adult epithelial or mesenchymal cell, usually in response to abnormal stimuli and often reverts back to normal on removal of the stimulus.

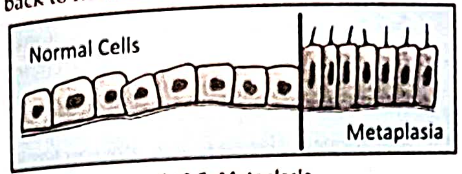

Fig 2.5: Metaplasia

Metaplasia is broadly classified into 2 types – epithelial and mesenchymal.

- ⇨ **Epithelial metaplasia:** This is the more common type. The metaplastic change may be patchy or diffuse and usually results in replacement by stronger but less well specialised epitheliaum.
  - ☐ **Squamous metaplasia:** Various types of epithelium are capable of undergoing squamous metaplastic change due to chronic irritation that may be mechanical, chemical or infective origin.
    1. In bronchus, (normally lined by pseudostratified columnar ciliated epithelium) in chronic smokers
    2. In uterine endocervix (normally lined by simple columnar epithelium) in prolapse of uterus and in old age
    3. In gall bladder (normally lined by simple columnar epithelium), in chronic cholecystitis with cholelithiasis
    4. In prostate (ducts normally lined by simple columnar epithelium) in chronic prostatitis and oestrogen therapy
    5. In renal pelvis and urinary bladder (normally lined by transitional epithelium) in chronic infection and calculi
    6. In vitamin A deficiency apart from xerophthalmia there is squamous metaplasia in nose, bronchi, urinary tract, lacrimal and salivary glands
- ⇨ **Columnar metaplasia:** There is transformation to columnar epithelium.
  - ☐ Intestinal metaplasia in healed chronic gastric ulcer
  - ☐ Conversion of pseudostratified columnar epithelium in chronic bronchitis and bronchiectasis to columnar type
  - ☐ In cervical erosion (congenital and adult type), there is variable area of endocervical glandular mucosa everted into vagina
- ⇨ **Mesenchymal metaplasia:** Less common type of metaplasia
  - ☐ **Osseous metaplasia:** Formation of bone in fibrous tissue, cartilage and myxoid tissue.
    1. Arterial wall in old age (Monckeberg's medial calcific sclerosis)
    2. In soft tissues in myositis ossificans
    3. In cartilage of larynx and bronchi in elderly people
    4. In scar of chronic inflammation of prolonged duration
    5. In the fibrous stroma of tumour
- ⇨ **Cartilaginous metaplasia:** in healing of fractures, cartilaginous metaplasia may occur when there is undue mobility.

Dysplasia

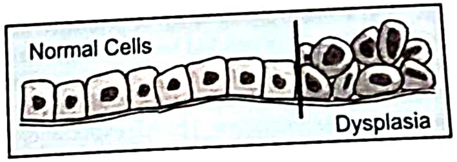

Fig 2.6: Dysplasia

Dysplasia means 'disordered cellular

development' often accompanied with metaplasia and hyperplasia, it is therefore also referred as atypical hyperplasia.

- ⇨ Dysplasia occurs most often in epithelial cells.
- ⇨ Epithelial dysplasia is characterised by cellular proliferation and cytologic changes. These changes include:
    - ☐ Increased number of layers of epithelial cells
    - ☐ Disorderly arrangement of cells from basal layer to the surface layer
    - ☐ Loss of basal polarity i.e. nuclei lying away from basement membrane
    - ☐ Cellular and nuclear polymorphism
    - ☐ Increased nucleocytoplasmic ratio
    - ☐ Nuclear hyperchromatism
    - ☐ Increased mitotic activity
- ⇨ The two most common examples of dysplasia changes are uterine cervix and respiratory tract.
- ⇨ Dysplastic changes may occur due to chronic irritation or prolonged inflammation. On removal of inciting stimulus, the dysplastic changes may disappear.

Cellular adaptations

Cellular Aging

Old age is a concept of longevity in human beings. The consequences of aging appear after reproductive age group. However, aging is distinct from mortality and disease although aged individuals are more vulnerable to disease.

The average age of death of primitive man was 20-25 years of age, but now life expectancy of an individual is raised upto 80 years. About a century ago, the main causes of death were accidents and infections. The life expectancy of an individual depends upon following factors.

1. Intrinsic genetic process i.e. genes controlling response to endogenous and exogenous factors intiating apoptosis in senility
2. Environmental factors e.g. consumption and inhalation of harmful substances, diet, role of antioxidants etc
3. Life style of the individual such as diseases due to alcoholism (cirhhosis, hepatoma), chronic smoking (bronchogenic carcinoma and chronic obstructive pulmonary disease) and drug addiction
4. **Age related diseases–** e.g. atherosclerosis, ischemic heart disease, diabetes mellitus, hypertension, osteoporosis, Alzheimer's disease, Parkinson's disease etc

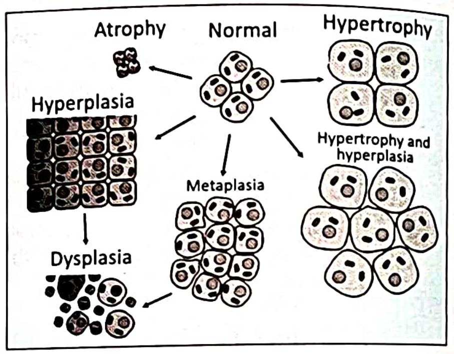

Fig 2.7: Cellular Adaptations

Organ changes observed in aging: all organs start showing deterioration with aging, following organs show evident morphologic and functional changes:

1. **Cardiovascular system–** atherosclerosis, arteriosclerosis with calcification, loss of elastic tissue from aorta
2. **Nervous system–** atrophy of sulci and gyri, Alzheimer's disease, Parkinson's disease
3. **Musculo skeletal system–** degenerative bone diseases, frequent fractures due to loss of bone density, age related muscular degeneration
4. **Eyes–** deterioration of vision due to cataract and vascular changes in retina
5. **Hearing–** disability in hearing due to senility is related to otosclerosis
6. **Immune system–** reduced IgG response to antigens, frequent and severe infections

7. **Skin–** laxity of skin due to loss of elastic tissue
8. **Cancers–** 80% of the cancers are seen in the age group of 50-80 years

Chapter Resources

1. Textbook of Pathology by Harsh Mohan, 5th Edition, Jaypee brothers, New Delhi, 2005
2. Website materials

Key points of the chapter

- ⇨ Cell is the structural and functional unit of living beings. Depending on the number of cells, living organisms are of two types – unicellular (comprising of only one cell) and multicellular (having multiple cells) organisms. Human being is a very complex multicellular organism made up of about 70,000 billion cells.
- ⇨ Cell injury is defined as a variety of stresses a cell encounters as a result of changes in its internal and external environment. Depending upon the type of cell and tissue involved and the extent and type of injury, cell injury is classified into two categories – reversible (the change is reversible when the etiological factor is removed) and irreversible (changes seen are irreversible even after the removal of etiological factor).
- ⇨ Causes of cell injury can be divided into two – genetic (structural defects are seen in genes) and acquired (causative factors exposed to an individual after birth. Genetic causes can be developmental defects, karyotypic defects, single gene defects, multifactorial inheritance disorders and storage diseases. Acquired causes can be hypoxia and ischemia; physical agents, chemical agents, microbial agents, immunological agents, nutritional derangements and psychological factors.
- ⇨ Cellular adaptations are adjustments made by the cells on exposure to changed environment. These are atrophy (size of the cell is reduced), hypertrophy (increase in the size of the cells) , hyperplasia (increase in the number of the cells), metaplasia (reversible transformation of growth where in tissue changes into another form) and dysplasia (disorderd cellular development).

Probable questions may be asked in the examination

Long essays

- ⇨ Describe the mechanism of cell injury and inflammation

Short essays

- ⇨ Define cell injury and explain various causes of cell injury
- ⇨ Enumerate cellular adaptations and explain atrophy in detail
- ⇨ Hypertrophy

Short answers

- ⇨ What is cell injury?
- ⇨ Enumerate cellular adaptions with examples
- ⇨ What is atrophy or hypertrophy or hyperplasia with suitable examples?
- ⇨ What are the differences between hypertrophy and hyperplasia?

MCQs

1. **Solitary kidney is an example of**
    a. Developmental defect of cell injury;
    b. Acquired cause of cell injury;
    c. Ischemia is the cause of cell injury;

d. Single gene defect

Answer -(a)

2. **Exposure to fire burn is an example of -------------type of cell injury.**

a. Physical agents;
b. Chemical agents;
c. Immunological;
d. Microbial

Answer -(a)

3. **Shrinkage of the ovary after menopause is an example of**

a. Atrophy;
b. Hypertrophy;
c. Hyperplasia;
d. Metaplasia

Answer -(a)

4. **Prostatic enlargement in elderly males is an example of**

a. Atrophy;
b. Hyperplasia;
c. Metaplasia;
d. Dysplasia

Answer -(b)

5. **In carcinoma of oesophagus, which type of cellular adaptation is seen?**

a. Atrophy;
b. Hypertrophy;
c. Hyperplasia;
d. Dysplasia

Answer -(d)

***

Inflammation and Healing

3

Learning objectives

- ⇨ To know the meaning of inflammation
- ⇨ To know the types of inflammation
- ⇨ To know the pathological events of inflammation
- ⇨ To know the clinical features of inflammation
- ⇨ To know the fate of inflammation

The word meaning of inflammation is burning. The process of inflammation is defined as the local response of living mammalian tissue to injury due to any agent. It is body's defence reaction in order to eliminate or limit the spread of injurious agent followed by removal of necrosed cell and tissue.

Causes of inflammation

- ⇨ **Infective agents** – bacteria, viruses and their toxins
- ⇨ **Physical agents** – heat, cold, radiation, mechanical trauma
- ⇨ **Chemical agents** – organic and inorganic poisons
- ⇨ **Immunological agents** – cell mediated immunity and antigen antibody reactionsTwo stages of inflammation: acute inflammation is of short duration whereas chronic inflammation is inflammatory response of longer duration.

Inflammation and infection

- ⇨ **Inflammation is distinct from infection** – the former being a protective mechanism by the body, wherein in infection, there will be invasion into the body by harmful microbes and their resultant ill-effects by toxins.
- ⇨ Inflammation involves two basic processes early inflammatory response and healing. Though both processes generally have protective role against injurious agents, inflammation and healing may cause considerable harm to the body e.g. anaphylaxis to bites of insects or honey bees, reptiles, drugs and toxins, atherosclerosis, intestinal adhesions etc.

Signs of inflammation: these first 4 fsigns are stated by Roman writer Celsus in 1st century AD.

- ⇨ Redness (rubor),
- ⇨ Tumour (swelling),
- ⇨ Dolor (pain)
- ⇨ Calor (local or generalised raise of temperature),
- ⇨ Functio lasea (loss of function pertaining to inflamed area) is added by Virchow.

Types of inflammation: depending upon the defence capacity of the host and duration of response, inflammation can be classified into two – acute and chronic.

- ⇨ **Acute inflammation** is of short duration and represents the early body reaction and is usually followed by repair

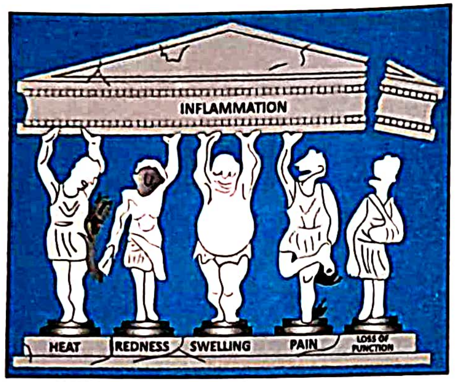

Fig 3.1: signs of inflammation

☐ **Acute inflammatory events:**

1. Accumulation of fluid and plasma at the affected site
2. Intravascular activation of platelets
3. Polymorphonuclear neutrophils

form as inflammatory cells

⇨ **Chronic inflammation** – is of longer duration and occurs either after the causative agent of acute inflammation persist for a long time, or the stimulus is such that it induces chronic inflammation from the beginning.

☐ The characteristic feature of chronic inflammation is presence of chronic inflammatory cells such as lymphocytes, plasma cells and macrophages and granulation tissue formation.

Events in acute inflammation: both events can occur simultaneously. For the purpose of better understanding, the events of acute inflammation are described in two headings.

1. Vascular events
2. Cellular events

Vascular events

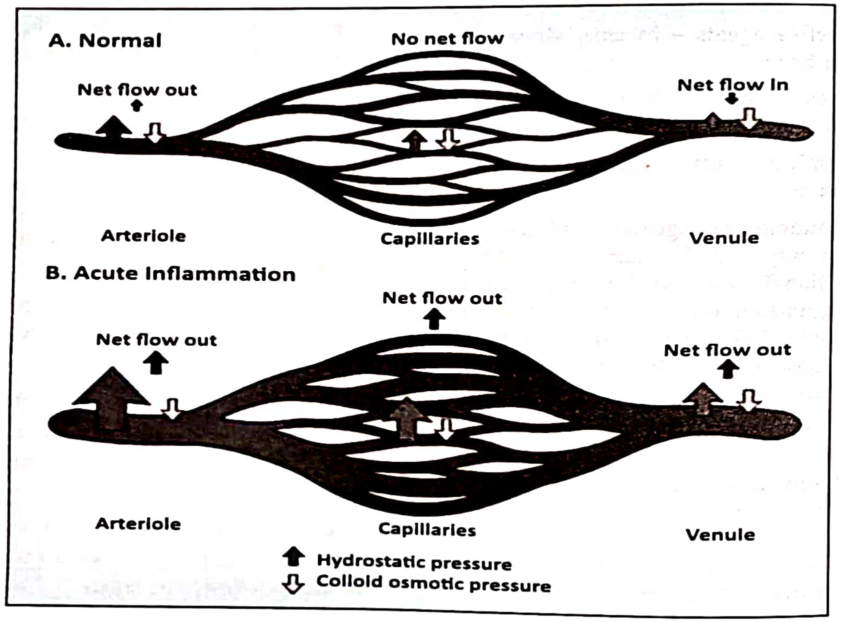

Fig 3.2: Vascular events

⇨ **Alteration in microvasculature (arterioles, capillaries and venules)** – hemodynamic changes like transient vaso constriction of arterioles lasting for 5 seconds to 5 minutes. In mild form of injury, the blood flow may be reestablished in 3-5 seconds while in severe injury, the vasoconstriction may last for 5 minutes.

⇨ **Persistent vasodilation:** within half an hour after injury, vasodilatation occurs. This results in increased blood volume to the affected site leading to redness and warmth of the affected site.

⇨ **Progressive vasodilatation:** The next event following persistent vasodilatation, there will be increased local hydrostatic pressure leading to transudation of fluid from intracellular to extracellular space. This is responsible for the swelling of the affected site.

⇨ **Slowing/ stasis:** The blood flow becomes slow so that there will increased permeability of microvasculature leading to increased concentration of red cells and thus rise of blood viscosity. This further facilitates leucocytic margination or peripheral orientation of leucocytes along vascular endothelium. The leucocytes then move and migrate through the gaps between endothelial cells into extravascular space. This is known as emigration.

⇨ **Altered vascular permeability:** In and around the inflamed tissue, there is accumulation of fluid in the interstitial compartment which comes from plasma by its escape through the endothelial wall of peripheral vascular bed.

☐ In the initial stage, the escape of fluid is due to vasodilatation and consequent elevation in hydrostatic pressure. This is transudate in nature.

☐ Subsequently, characteristic inflammatory oedema develops as a sequel to increased vascular permeability of microcirculation.

☐ The mechanism of function of microcirculation is being explained with the Sterling forces which is being explained in detail in the context of oedema.

☐ Forces that cause outward movement of fluid from capillary to interstitial space are intravascular hydrostatic pressure and osmotic pressure of interstitial fluid.

☐ Forces that cause inward movement of fluid from interstitial space to capillary are intravascular osmotic pressure and hydrostatic pressure of interstitial fluid.

☐ Mechanism of increased vascular permeability:

⇨ **Contraction of endothelial cells–** most common mechanism of increased leakiness that affects exclusively venules than arterioles and capillaries. The endothelial cells will have increased gap between them owing to contraction of the cells. This is mediated by the release of histamine, bradykinin. The response begins immediately and is of short duration 15-30 minutes. Example of such injury is immediate transient leakage is mild thermal injury of skin of forearm.

⇨ **Direct injury to endothelial cells–** leads to cellular necrosis and appearance of physical gaps at the sites of detached endothelial cells. Process of thrombosis will be initiated at the site of damaged endothelial cells. This may occur after 2-12 hours post injury and may persist for hours to days. The examples of such reactions is moderate thermal injury and radiation injury.

⇨ **Endothelial injury mediated by leucocytes–** adherence of leucocytes to the endothelium at the site of inflammation may result in activation of leucocytes. These activated leucocytes release proteolytic enzymes and may cause endothelial injury and increased vascular leakiness. This kind of mechanism can be seen in pulmonary capillaries and venules.

- ⇨ **Neo vascularisation–** this occurs during the process of repair.

Cellular events:

It consists of 2 processes–

(a) Exudation of leucocytes and

(b) Phagocytosis

(a) Exudation of leucocytes: escape of WBC from lumen of microvasculature to interstitial tissue. This includes margination, pavementing, rolling and adhesion, emigration, chemotaxis

- ⇨ **Margination–** in the early stage of inflammation, the rate of blood flow to inflamed tissue is increased due to vasodilation. This is followed by slowing or stasis of blood stream. With this, there will be change in the normal flow of blood within the vessel (change in trilaminar blood flow). Due to slowing, the central stream of cells widens and peripheral plasma zone becomes narrower due to loss of plasma by the process of exudation. This whole phenomenon is called as margination.
- ⇨ **Due to redistribution of blood stream,** neutrophils of the central column come closer to the vessel wall. This is termed as pavementing.
- ⇨ **Rolling and adhesion–** peripherally marginated neutrophils slowly roll over the endothelial cells lining the vessel wall. This is termed as rolling phase. This is followed by the transient bond between leucocytes and endothelial cells becoming firmer. This is termed as adhesion.
- ⇨ **Emigration–** after sticking of neutrophils to the endothelium, the former move along the endothelial surface till a suitable site between the endothelial cells is found where the neutrophils throw out cytoplasmic pseudopods. Subsequently, the neutrophils lodged between the endothelial cells and basement membrane cross the basement membrane by damaging it locally with secreted collagenases and escape out into extravascular space. This process is termed as emigration.

Simultaneously escape of RBCs through gaps between the endothelial cells along with emigration of leucocytes takes place. This is termed as diapedesis. This phenomenon gives the swelling haemorrhagic appearance.

- ⇨ **Chemotaxis–** chemotactic factor mediated transmigration of leucocytes after crossing several barriers (endothelium, basement membrane, perivascular fibroblasts and matrix) to reach the interstitial tissues is called chemotaxis. This is mediated by several substances called chemokines such as cytokines etc.

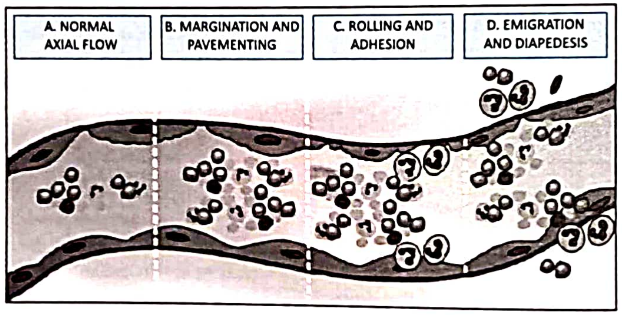

Fig 3.3: Exudation of Leucocytes

(b) Phagocytosis: It is the process of engulfing of solid polymorphonuclear cells (microphages) and circulatory monocytes and macrophages. They produce proteolytic enzymes like lysosomes, protease, gelatinase, lipase, protease, elastinase, collagenase and acid hydrolaeses. They degrade collagen and extracellular matrix. The process invloves

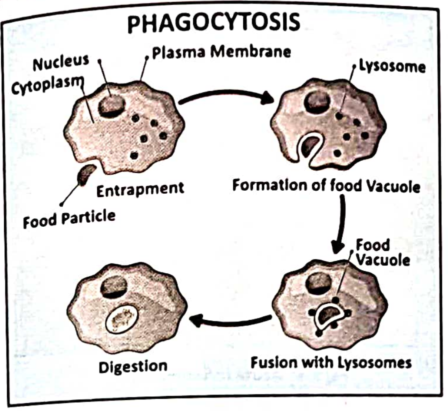

Fig 3.4: Phagocytosis

- ⇨ **Recognition and attachment–** the phagocytic cells are recognised and attracted to the bacteria by chemotactic factors released by bacterial products as well as tissue proteins. In order to establish a bond between bacteria and the cell membrane of the phagocytic cell, the microorganisms get coated with opsonins which are naturally occurring factors in the serum.
- ⇨ **Engulfment–** the opsonised particle bound to the surface of phagocyte is ready to be engulfed. This is accomplished by formation of cytoplasmic pseudopods around the particle due to activation of actin filaments beneath the cell wall, enveloping it in a phagocytic vacuole. This is called as phagosome.
- ⇨ **Degranulation stage–** during this stage, the preformed granule-stored products of polymorphonucleuar cells or neutrophils are discharged or secreted into the phagosome and extracellular environment.
- ⇨ **Killing or degradation by hydrolytic enzymes –** the microorganisms after being killed by antibacterial substances are degraded by hydrolytic enzymes.

Morphology of acute inflammation: the following are the various morphological changes observed in acute inflammation.

1. **Pseudomembranous inflammation–** it is inflammatory response of mucous surface (oral, respiratory, bowel) to toxins of diphtheria or irritant gases. As a result of denudation of epithelium, plasma exudes on the surface where it coagulates, and together with necrosed epithelium, forms false membrane that gives the name of pseudomembranous inflammation.
2. **Ulcer–** ulcers are local defects on the surface of an organ produced by inflammation. The commonest sites ulceration are stomach, duodenum, intestinal ulcers in typhoid fever, ulcers on the legs with varicose veins. In the acute stage, there is infiltration by polymorphs with vasodilatation while long stading ulcer develop infiltration by lymphocytes, plasma cells and macrophages with associated fibroblastic proliferation and scarring.
3. **Suppuration (abscess formation):** when acute bacterial infection is accompanied by intense neutrophilic infiltrate in the inflamed tissue leading to tissue necrosis. This leads to formation of cavity termed as abscess.
4. **Cellulitis –** this is a diffuse inflammation of soft tissues resulting from spreading effects of substances released by some bacteria such as hyaluronidase.
5. **Bacterial infection of blood –** this includes bacteraemia, septicemia and pyemia

- ⇨ **Bacteraemia –** presence of small number of bacteria in the blood which do not multiply significantly. They are commonly not detected by direct microscopy. Blood culture is done for their detection e.g. infection with Salmonella typhi, E. coli, Streoptococcus viridans.

- ⇨ **Septicemia** – presence of rapidly multiplying, highly pathogenic bacteria in the blood e.g. pyogenic cocci. Septicemia is generally accompanied by systemic effects like toxemia, multiple small hemorrhages, neutrophilic leucocytosis and disseminated intravascular coagulation (DIC).
- ⇨ **Pyemia** – dissemination of small septic thrombi in the blood which cause their effects at the site where they are lodged. This can result in pyemic abscesses or septic infarcts.

Systemic effects of acute inflammation: they include fever, leucocytosis, lymphangitis – lymphadenitis and shock.

1. **Fever** – occurs due to bacteraemia. It is thought to be mediated through releases of factors such as prostaglandins, tumour necrosis factor (TNF) etc in response to infection.
2. **Leucocytosis** – accompanies acute inflammations where in WBC count will raise more than 11,000 cells / cmm.
3. **Lymphangitis and lymphadenitis** – the lymphatics and lymph nodes drain the inflamed tissue show reactive inflammatory changes in the form of lymphangitis (inflammation of lymphatics) and lymphadenitis (inflammation of lymph nodes)
4. **Shock** – may occur in severe cases. Massive release of TNF-α, a mediator of inflammation, in response to severe tissue injury or infection results in profuse systemic vasodilatation, increased vascular permeability and intravascular volume loss. The outcome is hypotension and shock. Systemic effects can be seen are disseminated intravascular coagulation (DIC), bleeding and death.

Fate of acute inflammation

1. **Resolution** – occurs when the tissue becomes normal completely. This occurs when the tissue changes are mild and cellular changes are reversible. E.g. resolution in lobar pneumonia.

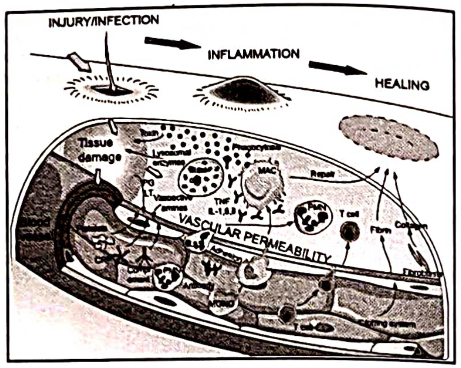

Fig 3.5: Acute inflammation

2. **Healing by scarring**– this takes place when the tissue destruction in acute inflammation is extensive so that there is no tissue regeneration and healing occurs by fibrosis.
3. **Progression into suppuration**– when pyogenic bacteria leading to acute inflammation lead to severe necrosis and further lead to the formation of pus formation (suppuration).
4. **Progression to chronic inflammation**– in this state, the processes of inflammation and healing proceed side by side.

Chronic inflammation: Chronic inflammation is defined as prolonged process in which destruction and inflammation occur at the same time.

Causes of chronic inflammation: This can occur in 3 ways:

- ⇨ **Chronic inflammation following acute inflammation:** when tissue destruction is extensive or bacteria survive and persist in small numbers at the site of acute inflammation e.g. osteomyelitis, pneumonia terminating in lung abscess.
- ⇨ **Recurrent attacks of acute inflammation**– when repeated bouts of acute inflammation culminate in chronicity of illness e.g. recurrent urinary tract infection leading to chronic pyelonephritis.
- ⇨ **Chronic inflammation starting de novo** – when the infection with organisms of low pathogenicity is chronic from the beginning, e.g. tuberculosis infection.

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General features of chronic inflammation

1. **Mononuclear cell infiltration**– chronic inflammatory lesions are infiltrated by mononuclear cells like phagocytes, lymphocytes, plasma cells and oesinophils.
2. **Tissue destruction or necrosis**– tissue destruction and necrosis are the central features of most of the chronic inflammatory lesions. This is brought about by tissue macrophages which release a variety of biologically active substances such as cytokines etc.
3. **Proliferative changes**– as a result of necrosis, proliferation of small blood vessels and fibroblasts is stimulated leading to the formation of inflammatory granulation tissue. Eventually healing by fibrosis will take place.

Systemic effects of chronic inflammation:

1. **Fever**– mild fever with loss of weight and weakness
2. **Anemia**–owing to bone marrow depression to produce RBCs and stimulation to produce leucocytes
3. **Leucocytosis**– lymphocytosis is more common
4. **ESR**– elevated in all chronic inflammation
5. **Amyloidosis**– long term cases of chronic suppurative inflammation may develop secondary amyloidosis

Repair or healing

Repair or healing is a natural phenomenon which involves the recovery of damaged structure occurred during cell injury. Once the inflammatory response finishes by phagocytosis, the repair or regeneration of new cell and tissue in the place of damaged area takes place. Depending upon the extent of cell injury, the new cells or replacement of new cells takes place. The new cell proliferation starts in the damaged place. If the damage is mild to moderate the new cell formed will be similar to those cells which existed previous to injury. But if the damage is severe then the repair process leaves fibrous tissue formation leading to scar.

Chapter Resources

1. Textbook of pathology by Harsha Mohan, 5th Edition, Jaypee brothers Publications, New Delhi, 2005
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders Publication, 2006
3. Best and Taylor's physiological basis of medical practice by O P Tandon & Yogesh Tripathi, Wolters Kluwer Publications, 2012

Key points of the chapter

- ⇨ The word meaning of inflammation is burning. The process of inflammation is defined as the local response of living mammalian tissue to the injury due to any agent.
- ⇨ Signs of inflammation as stated by Roman writer Celsus are Calor (local or generalized raise of temperature), Dolor (pain), Rubor (redness), Tumor (swelling) and Functio lasea (loss of function). Functio lasea as a sign of inflammation was added by Virchow.
- ⇨ Two types of inflammation – acute and chronic depending upon the defense capacity of the host and duration of response. Acute inflammation is of short duration and represents early body reaction and usually followed by

repair. Chronic inflammation is of longer duration and occurs either after the causative agent of acute inflammation persist for a long time, or the stimulus is such that it induces chronic inflammation from the beginning.

- ⇨ Events in acute inflammation: Vascular events and cellular events – both these events occur simultaneously. Vascular events include vaso constriction for 5 seconds to 5 minutes, followed by vaso dilatation. This is followed by slowing of blood circulation, altering the vascular permeability so that more amount of fluid including blood cells will enter the target tissue secondary to damage to the endothelial cells of capillary. Cellular events consist of two processes – exudation of leucocytes and phagocytosis.
- ⇨ Fate of acute inflammation – resolution, healing by scarring, progression into suppuration, progression to chronic inflammation.

Probable questions may be asked in the examination

Long essay

- ⇨ What is inflammation? Explain the vascular and cellular events occur during the pathogenesis of inflammation
- ⇨ Describe the mechanism of cell injury and inflammation
- ⇨ Define inflammation and classify it. Write down the causes and cardinal features of acute inflammation. Mention briefly the stages of acute inflammation.

Short essays

- ⇨ What is inflammation? Explain the pathogenesis of inflammation in brief
- ⇨ What is inflammation? What are the different signs and symptoms observed in general? explain with examples
- ⇨ What are the clinical features of inflammation?

Short answers

- ⇨ What is inflammation?
- ⇨ Write the signs of inflammation
- ⇨ Write the fates of inflammation
- ⇨ Write the systemic effects of acute inflammation
- ⇨ What is phagocytosis?
- ⇨ What are the stages of bacterial infection in blood?

MCQs

1. **The word calor refers to**
   a. Raise of temperature;
   b. Pain;
   c. Redness;
   d. Swelling
   Answer -(a)
2. **Leucocytes which become during acute inflammation are**
   a. Lymphocytes;
   b. Neutrophils;
   c. Basophils;
   d. Monocytes
   Answer -(b)
3. **In chronic inflammation, leucocytes become active are**
   a. Lymphocytes:
   b. Neutrophils;
   c. Basophils;
   d. Oesinophils
   Answer -(a)
4. **The term lymphadenitis refers to inflammation of**
   a. Lymphatics;
   b. Lymphatic vessels;
   c. Lymph nodes;
   d. All of the above
   Answer -(c)
5. **The term balanitis refers to the inflammation of**
   a. Testis;
   b. Ovary;
   c. Glans penis;
   d. Urinary bladder
   Answer -(c)

***

Different pathological events happening inside the human body

4

Learning objectives

- ⇨ Meaning of oedema, shock, hemorrhage, thrombosis, embolism, ischemia and infarction
- ⇨ What are the probable pathophysiological mechanisms of these abnormal processes?
- ⇨ What is Sterling force and its role in microcirculation?
- ⇨ What are clinical examples of these pathological mechanisms?

[1] Before discussing the mechanism of oedema, we need to understand the mechanism of Sterling forces to know the better understanding of the movement of nutrients and metabolites across the capillary membrane.

The Greek word oedema means swelling. It is defined as abnormal and excess accumulation of fluid in the interstitial spaces and serous cavities.

- ⇨ The presence of abnormal collection of fluid within the cell is termed as hydropic degeneration
- ⇨ Presence of excess fluid in the peritoneal cavity is termed as ascites, in the pleural cavity is termed as hydrothorax or pleural effusion; in pericardial cavity is termed as pericardial effusion

Mechanism of oedema

- ⇨ **Increased capillary hydrostatic pressure at veins (> 12 mmHg)**: normally, capillary hydrostatic pressure will be helping in the transfer of the fluid into the interstitial compartment from the capillary. When

G K

1 This is the pressure difference observed across the capillary membrane between the capillary intra capillary blood and interstitial fluid compartment.
Two types of pressure are acting across the capillary membrane. They are hydrostatic pressure and osmotic pressure. Hydrostatic pressure is responsible for pushing of the fluid, nutrients across the capillary membrane. Oncotic pressure is responsible for the pulling of the fluid across the capillary membrane.
This mechanism is better understood by the concept of Sterling forces.

- ⇨ The intracapillary hydrostatic pressure and interstitial oncotic pressure will lead to the movement of fluid, nutrients from capillary to interstitial compartment.
- ⇨ HP of capillary + OP of capillary – (HP of interstitial space + OP of interstitial space)
- ⇨ 32 mmHg + (-25 mmHg) – 4 mmHg + 8 mmHg
- ⇨ 7 mmHg+ 4 mmHg = 11 mmHg
- ⇨ With the amount of 11 mmHg, the fluid will move from capillary to interstitial space
- ⇨ The oncotic pressure of capillary and hydrostatic pressure of interstitial compartment will lead to the movement of fluid, metabolites from the interstitial space to capillary.
- ⇨ HP of capillary + OP of capillary – (HP of interstitial space + OP of interstitial space)
- ⇨ 12 mmHg + (-25 mmHg) – 4 mmHg + 8 mmHg
- ⇨ – 13 mmHg+ 4 mmHg = -9 mmHg
- ⇨ With the amount of – 9 mmHg, the movement of fluid, metabolites occurs from interstitial space to capillary.

there is elevation in the capillary hydrostatic pressure, more amount of the fluid will be moving into the interstitial compartment.

- **E.g. ascites, cardiac oedema**
- **Passive congestion–** mechanical obstruction due to thrombosis in lower limbs, varicosities, pregnant uterus
- **Postural oedema**

- **Decreased plasma oncotic pressure:** normally, the plasma oncotic pressure exerted by the proteins and electrolytes present in the blood vessels tend to pull the blood into the capillaries, thereby counteracting on the hydrostatic pressure of the capillary. When the plasma proteins are reduced and there is reduced electrolytes in the blood, more amount of fluid will be transferred into the interstitial compartment and reverse movement from the interstitial compartment to the capillary will be hampered. This mechanism usually produces generalised oedema.
  - Hypoproteinemia (< 5g/ dl) – leading to anasarca (generalised oedema)
  - Renal oedema
  - Ascites associated with hypoproteinemia including oedema
- **Increased capillary permeability–** intact capillary membrane is a semipermeable membrane which permits the free flow of water and crystalloids, but allows minimum flow of plasma proteins. Increased capillary permeability occurs due to the damage to the capillary endothelium by various toxins such as histamines, venoms, certain drugs and chemicals. This causes reduced plasma oncotic pressure and increased interstitial plasma oncotic pressure.
  - Systemic infection
  - Trauma
  - Poison consumption
  - Drug and chemicals
  - Anaphylaxis
  - Insect bites
  - Angioneurotic oedema
- **Lymphatic obstruction–** normally, the interstitial fluid in the tissue spaces escapes by way of fluid, leaked proteins from the capillaries in particular. Any obstruction in the passage of lymph generally produces non pitting type of oedema. This is known as lymphedema.
  - Filariasis
  - **Brawny oedema–** mastectomy induced oedema of upper limb on the side of the mastectomy
  - Pressure to thoracic duct due to tumour
  - Malignant infiltration
- **Sodium and water retention–** this occurs when the person is having dehydration or activation of renin angiotensin system or ADH secretion, leads to the excess reabsorption of sodium and water retention.
  - Cardiac oedema
  - Hepatic oedema
  - Renal oedema

Classification of oedema

- **Based on the location of the body:**
  - **Generalised–** oedema is observed all over the body i.e. systemic in distribution. Most probable cause of this type of oedema is hypoproteinemia. In this situation, there will be reduced plasma oncotic pressure, which leads to the shift of fluid from capillary to interstitial space all over the body.
  - **Localised–** oedema is localised to one particular part of the body either limb or organ. This is usually attributable to either inflammation or obstruction of the blood vessels or lymphatics or immobility of the part of the body (cerebro vascular accident).
- Based on pathogenesis in the body
  - **Inflammatory–** where all signs of inflammation are seen – calor (local raise of temperature), dolor (pain), rubor (redness), tumour (swelling) and function lasea (loss of function of affected part).
  - **Non inflammatory–** signs of inflammation are not observed in this type of oedema. For example, cardiac oedema, renal oedema, hepatic oedema and hypoproteinemia induced oedema.
- Based on clinical findings
  - **Pitting–** momentary pressure of the finger produces a depression in the area where pressure is being applied. The conditions where lymphatic obstruction is not present such as cardiac oedema, renal oedema, hepatic oedema and oedema of hypoproteinemia we can see pitting type of oedema.
  - **Non pitting–** momentary pressure of the finger do not produce a depression in the area where pressure is being applied. The conditions where lymphatic obstruction is present such as filariasis, lymphadenectomy (removal of lymph nodes), lymphangectomy (removal of lymphatic vessels) we can observe non pitting type of oedema.
- Based on duration of pitting on pressure
  - **Fast pitting–** on applying pressure on the oedematous part will be disappearing within 40 seconds. In conditions such as cardiac oedema, renal oedema, hepatic oedema, we can see fast pitting type of oedema.
  - **Slow pitting–** on applying pressure on the oedematous part will be disappearing after 60 seconds. In condition associated with hypoproteinemia, we can observe slow pitting type of oedema.
- Based on laboratory findings
  - Transudate
  - Exudate

Table 4.1: Difference between transudate and exudate

Characters	Transudate	Exudate
Definition	Filtrate of blood plasma without changes in endothelial permeability	Oedema of inflamed tissue associated with increased vascular permeability
Characters	Non inflammatory	Inflammatory
Proteins	Low (< 1 g/ dl) mainly albumin, low fibrinogen	High (2.5 – 3.5 g/ dl), high content of fibrinogen and other coagulation factors
Glucose	Same as plasma	Low (<60 mg/dl)
Specific gravity	Low (<1.015)	High (>1.018)
pH	>7.3	<7.3
Cells	Few cells mainly mesothelial cells and cellular debris	Many cells inflammatory and parenchymal
Example	Congestive cardiac failure	Pus accumulation in any part of the body

- **Cardiac oedema: -** This is a condition where in the person will be having bilateral pedal oedema in the evening time. This is gravity dependant type of oedema i.e. the person will be having oedema in both lower limbs while ambulation and during recumbent posture, the person will have oedema in the sacral region. This is seen in congestive cardiac failure, in right sided heart failure. This will be associated with visible JVP on the right side, pain in the right upper quadrant, nausea, loss of appetite etc. When the person is presented with left sided heart failure, he will be having breathlessness on exertion, cough with pink frothy sputum and on further progression of left sided heart failure, he will be developing the clinical features of right sided heart failure.

- **Renal oedema–** this is a condition where person will be having generalised oedema. In this situation, the person will be complaining of periorbital oedema in early morning hours. This will be associated with conditions such as uncontrolled diabetes mellitus.
- **Hepatic oedema–** this is another condition where the person will have generalised oedema, but earliest manifestation of this pathophysiology is manifestation of ascites (accumulation of fluid in peritoneal cavity).
- **Pulmonary oedema–** in this situation, the accumulation of fluid will be present in interstitial spaces as well as in alveoli. Most probable cause of pulmonary oedema is left sided heart failure which is a sequel of either aortic stenosis or atherosclerosis of the aorta. This is presented with breathlessness on exertion, paroxysmal nocturnal dyspnoea, orthopnoea and Cheyne stokes breathing, cough with pink frothy sputum.
- **Nutritional oedema–** is the condition where decreased level of proteins in the blood will lead to reduced plasma oncotic pressure, thereby leading to the state of increased fluid in the interstitial spaces. Here the term is oedema of hypoproteinemia. This is slow pitting type of oedema.
- **Cerebral oedema–** cerebral oedema or swelling of the brain is the most threatening example of oedema. The mechanism of fluid exchange in the brain differs from elsewhere in the body since there are no draining lymphatics in the brain but instead, the function of fluid-electrolyte exchange is performed by the blood brain barrier located at the endothelial cells of the capillaries.

Investigations performed in case of valuation of oedema

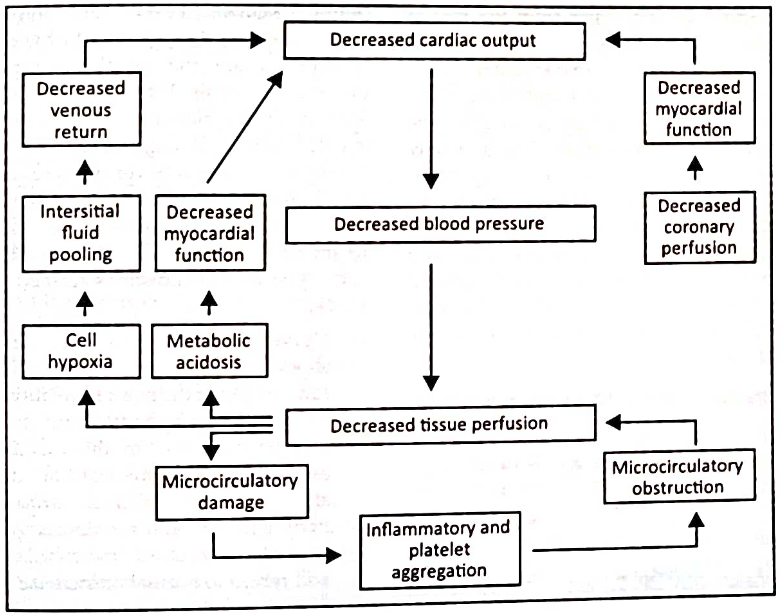
- **Blood urea–** this is of significance in case of hepatic and renal oedema. In case of hepatic cause of oedema, the level of blood urea is reduced and in case of renal cause of oedema, there will be raise in serum urea level.
- **Serum creatinine–** this is of clinical significance in case of renal evaluation. Creatinine is a kind of metabolite which is only excreted via kidney. That is the reason, elevated level of serum creatinine is the indicator of worsening of renal function.
- **Serum electrolytes–** the evaluation of serum sodium is of prime importance as far as evaluation of oedema is concerned. Enhanced serum sodium in the blood increases the volume of the blood. Thus, hydrostatic pressure of the capillary will increase which in turn leads to the manifestation of oedema.
- **Urine analysis–** will be helpful in the evaluation of renal dysfunction.
- **Chest X ray–** the assessment of chest X ray is helpful in evaluation of left ventricular hypertrophy, pulmonary oedema due to left sided heart failure.
- **ECG** – the assessment of ECG is of clinical significance in the evaluation of cardiac dysfunction.

Shock

Normally, when the person is having reduction in cardiac output, that may lead to the upsurge of the peripheral vascular resistance. This will maintain the adequate perfusion required for the nourishment of brain and heart bypassing the blood circulation to the skin, muscles and alimentary canal. When the mean arterial pressure reduces significantly i.e. < 60 mmHg, then perfusion to the brain and heart also falls leading to the initiation of shock syndrome.

Shock[2] is the clinical syndrome that results from inadequate tissue perfusion. Irrespective of cause, the hypoperfusion[3]-induced imbalance between the delivery of and requirements for oxygen and substrate leads to cellular dysfunction. The cellular injury caused by above pathophysiology induces the production of inflammatory mediators which further compromise perfusion through structural and functional changes within microvasculature. This leads to the vicious cycle of cellular injury and compromised blood flow, leading to multiple organ failure and if proper measures are not taken for thecorrection of the blood flow, that may end up in death of the individual.

- When severe and persistent shock is present in an individual it may lead to irreversible cell injury which can be restored only on administering oxygen therapy at the earliest.
- Clinically, shock is accompanied by hypotension i.e. mean arterial pressure < 60 mmHg in previously normotensive persons.


Decreased cardiac output
Decreased venous return
Decreased myocardial function
Intersitial fluid pooling
Decreased myocardial function
Decreased blood pressure
Decreased coronary perfusion
Cell hypoxia
Metabolic acidosis
Decreased tissue perfusion
Microcirculatory damage
Microcirculatory obstruction
Inflammatory and platelet aggregation

Flowchart 4.1: Shock

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[2] Shock can be manifested due to either decreased cardiac output or due to without decreased cardiac output
Shock due to reduced cardiac output
1. Cardiac abnormalities that decrease the ability of heart to pump blood e.g. in myocardial infarction, arrhythmias
2. Factors that decrease the venous return, diminished blood volume such as hypovolemia
Shock due to without the reduction of cardiac output
1. Excessive metabolism of the body, so that even a normal cardiac output is not adequate
2. Abnormal tissue perfusion patterns

[3] The main pathophysiology of shock will lead to inadequate delivery of nutrients to critical tissues and critical organs (brain and heart) and also cause inadequate removal of waste products from the tissues.

Table 4.2: Differential diagnosis of shock

Differential diagnosis of shock	
Hypovolemic shock	
Traumatic shock	
Cardiogenic shock	Intrinsic shock Compressive shock
Septic shock	Hyperdynamic shock Hypodynamic shock
Neurogenic shock	
Hypoadrenal shock	

Hypovolemic shock: This is the most common form of shock arising either from the loss of blood cell mass or from the loss of plasma volume arising from extracellular fluid sequestration or gastrointestinal, urinary or insensible losses. The symptoms of this type of shock are incidious in onset. This is usually characterised by stimulation of sympathetic system, hyperventilation, collapse of venous capacitance vessels, release of stress hormones, shift of the interstitial and intracellular fluid to intravascular compartment and reduced urinary output. The clinical presentation may vary in different varieties of shock depending upon the severity.

Table 4.3: Clinical features of different stages of shock

Mild (< 20% of blood volume)	Moderate (20-40% of blood volume)	Severe (>40% of blood volume)
Cool extremities	Same +	Same +
Increased capillary refill time	Tachycardia	Haemodynamic instability
Diaphoresis (sweating)	Tachypnoea	Marked tachycardia
Collapsed veins	Oliguria	Hypotension
Anxiety	Postural changes	Deterioration of mental status (coma)

Traumatic shock: This type of shock occurs when the person is met with the trauma. It diminishes filling pressure of the circulation. As a consequence of this phenomenon, there will be reduction in the venous return into the heart. Thus, there will be drop in the cardiac output below normal, thus, shock will be occurring.

Cardiogenic shock: This type of shock is characterised by systemic hypoperfusion. It occurs either by myocardial infarction or aortic stenosis induced congestive cardiac failure. This is termed as intrinsic shock. Compressive type of cardiogenic shock manifests due to the compression of the heart due to pericardial effusion.

Septic shock: Fever or hypothermia, leucocytosis or leucopenia, tachycardia and tachypnoea are the usual accompaniments observed in sepsis. When sepsis is associated with the dysfunction of distant organs from the site of infection, it suggests that the person is having severe sepsis. Severe sepsis is associated with hypotension or hypoperfusion of different internal viscera. If the person does not respond to intravenous fluids to hypotensionm then such type of mechanism is termed as septic shock.

- ⇨ **Hypodynamic and hyperdynamic** shock are the terms used to depict the functioning of the heart in relation to septic shock. During hypodynamic shock, there will be reduction in the cardiac output associated with myocardial depression and hypotension and drop in the peripheral vascular resistance. Whereas in hyperdynamic shock, the cardiac output is will return to normal or increase in cardiac output.

Neurogenic shock: Interruption in the sympathetic vasomotor input due to high cervical injury, head injury leads to the neurogenic shock. In addition to arterial dilatation, there will be venous dilatation cessating the movement in the veins thus reducing the cardiac output. In this type of shock, the extremities are warm whereas the shock due to hypovolemic or cardiogenic shock, extremities are cold due to the vaso constriction due to hypovolemia.

Hypoadrenal shock: The normal host response to the stress of illness or operation or trauma, hypersecretion of cortisol which is a secretion of adrenal cortex excess than its requirement. In the persons who receive excess cortisol as a therapy in these situations. The clinical conditions where hypoadrenal shock occur are tuberculosis, metastatic disease etc.

Based on the physiological causes of shock, circulatory shock occurs by two mechanisms either by decreased cardiac output or by without declined cardiac output.

Stages of shock

Depending upon the degree of severity, shock is divided into 3 stages

1. **Non progressive stage (compensated stage):**[4] The normal circulatory compensatory mechanisms eventually cause full recovery without help from the outside therapy.
2. **Progressive stage:** Shock becomes steadily worse until death without therapy. The above said vicious cycle of shock happens in this stage.
3. **Irreversible stage:** The pathology of shock has progressed to such an extent that all forms of known therapy are inadequate to save the person's life even though the person is still live for the moment.

Different types of positive feedback that can lead to progression of shock[5]. In other words to say, each increase in the degree of shock causes a further increase in the shock.

- ⇨ **Cardiac depression** – reduced blood flow to the myocardial muscles via coronary vasculature will further weakens the heart muscles, thereby reducing cardiac output. Thus, with this kind of positive feedback, the shock becomes more severe and severe.
- ⇨ **Vasomotor failure** – in the early stages of shock, there will be activation of sympathetic nervous system, which later helps in the prevention of decreased arterial pressure. Afterwards, a set point reaches, where diminished blood flow to the vasomotor centre of brain occurs which further depresses the cardiac output.
- ⇨ This further leads to the inactiveness of vasomotor centre and this phenomenon will lead to decreased cardiac output.
- ⇨ **Blockage of very small vessels** – this is nothing but sluggish movement of blood in the microvessels. Because of tissue metabolism continues despite the low flow, large amounts of acid, both carbonic acid and lactic acid, continue to empty into the local blood vessels and greatly increase the local acidity of the blood. These acids along with other deterioration products from ischemic tissues, causes local blood agglutination, leading to minor clots and small plugs in the small vessels. This phenomenon makes the blood more difficult to move further into general circulation.
- ⇨ **Increased vascular permeability** – after many hours of capillary hypoxia and lack of other nutrients, the permeability of the capillaries gradually increases, and large quantities of fluid begin to transude into the tissues. This mechanism reduces the intravascular volume and further reduces cardiac output.

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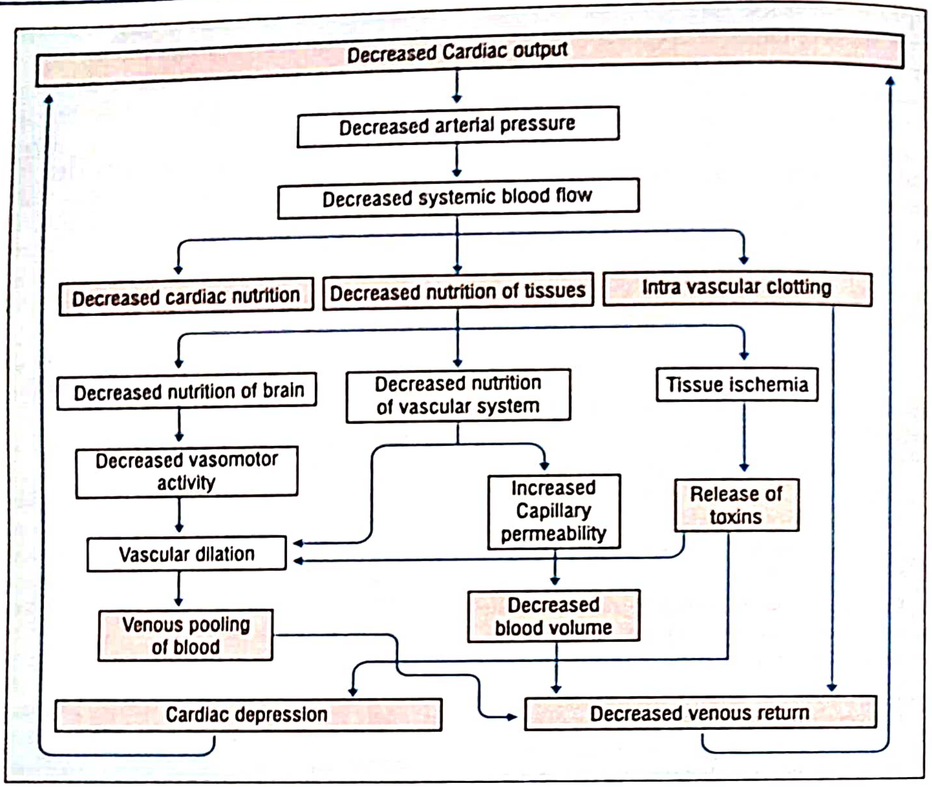
[4] The following mechanisms are happening in the pathophysiology of non progressive stage of shock:
1. Baro receptor reflexes elicit powerful sympathetic stimulation of circulation
2. Central nervous system ischemic response, activated when arterial pressure falls below 50 mmHg
3. Reverse stress relaxation of circulator system
4. Formation of angiotensin by kidneys lead to enhancement of blood pressure
5. Formation of vasopressin (anti diuretic hormone) by neurohypophysis leading to conservation of water from kidneys
6. Compensatory mechanisms that return the blood volume back to normal i.e. absorption of large quantities of fluid from alimentary canal, absorption of fluid from interstitial spaces, conservation of water and salt from kidneys and increased thirst

[5] Source: Guyton's textbook of physiology, 11th edition


Decreased Cardiac output
Decreased arterial pressure
Decreased systemic blood flow
Decreased cardiac nutrition
Decreased nutrition of tissues
Intra vascular clotting
Decreased nutrition of brain
Decreased nutrition of vascular system
Tissue ischemia
Decreased vasomotor activity
Increased Capillary permeability
Release of toxins
Vascular dilation
Decreased blood volume
Venous pooling of blood
Cardiac depression
Decreased venous return

Flowchart 4.2: pathophysiology of shock

- ⇨ **Release of toxins by ischemic tissues** – the mechanism of shock causes tissues to release toxic substances such as histamine, serotonin and tissue enzymes which leads to further deterioration of the circulatory system.
- ⇨ **Cardiac depression caused by endotoxin** – endotoxins are released from the bodies of dead gram negative bacteria in the intestines. Diminished blood flow to the intestines often causes further release of endotoxins and absorption into general circulation. The circulating toxin causes increased cellular metabolism and this has a depressive effect on myocardium.
- ⇨ **General cellular deterioration** – as shock becomes severe, many signs of generalised cellular deterioration occur throughout the body. The damaging cellular effects occur are as follow:

1. Active transport of sodium and potassium through the cell membrane is greatly diminished. As a result, sodium and chloride accumulate in the cells, and potassium is lost from the cells. This leads to swelling of the cell.
2. Mitochondrial activity in many of the tissues is severely depressed.
3. Lysosomes in the cells in widespread tissue areas begin to break open, with intracellular release of hydrolases that cause further intracellular deterioration.
4. Cellular metabolism of nutrients such as glucose, becomes depressed in the last stages of shock.

- ⇨ **Patchy areas of necrosis in different tissues**– cells adjacent to the arterial ends of capillaries will have better blood supplies than venous ends of the capillaries, thus tissues adjacent to the arterial ends of capillaries will have better nutrition than the tissues adjacent to venous ends of capillaries.
- ⇨ Acidosis in shock – most metabolic derangements that occur in shocked tissue can lead to acidosis of the blood with increase in carbonic acid and lactic acid in the blood. This leads to further reduction in the blood flow in the affected tissue.

Hemorrhage

Hemorrhage is derived from Greek word means burst of the blood. Haeme means blood and orrhage refers to burst. In other words, it means escape of blood from blood vessels. Bleeding can occur externally or internally into the serous cavities (hemothorax, hemoperitoneum, hemopericardium) or into hollow viscus.

- ⇨ **Trauma** – most common cause of haemorrhage; trauma to small vessels cause bruising and trauma to large vessels lead to extensive bleeding
- ⇨ Tumours and infections often erode small blood vessels leading to minor bleeding
- ⇨ Aneurysm and other diseases of blood vessel weaken the wall of blood vessel leading to haemorrhage
- ⇨ Congestion and hypoxia will lead to minor haemorrhages
- ⇨ Failure of haemostatic mechanisms may cause bleeding in skin and other parts

Terms used in haemorrhage

- ⇨ **Petechiae**– small hemorrhages in tissues (In Italian language, meaning freckle)
- ⇨ **Ecchymosis**– large haemorrhages in tissues and skin (Greek language, meaning extravasation)
- ⇨ **Purpura**–multiple petechiae or ecchymoses over skin and other tissues upto 1cm
- ⇨ **Hematoma** – haemorrhage which cause large lump (Greek language, means tumour or lump)

Causes of hemorrhage: the blood loss may be large and sudden (acute), or small repeated bleeds may occur over a period time (chronic). The various causes of hemorrhages are listed below:

1. **Trauma to the vessel wall**– e.g. penetrating wound in the heart or blood vessels, during labour
2. Spontaneous hemorrhage e.g. rupture of an aneurysm, septicemia, bleeding diatheses, acute leukemia, pernicious anemia, scurvy
3. **Inflammatory lesions of the vessel wall** – bleeding from chronic peptic ulcer, typhoid ulcers, blood vessels traversing a tuberculous cavity in the lung, syphilitic involvement of the aorta and polyarteritis nodosa
4. **Neoplastic invasion**– e.g. following vascular invasion in carcinoma of the tongue
5. **Vascular diseases** – atherosclerosis
6. **Elevated pressure within the vessels**– e.g. cerebral and retinal hemorrhages in systemic hypertension, severe hemorrhages from varicose veins due to high pressure in the veins of legs and oesophagus

Effects of hemorrhage: the effects of blood loss depends upon 3 main factors

- ⇨ The amount of blood loss
- ⇨ The speed of blood loss
- ⇨ The site of the hemorrhage
  - ☐ **20% loss of blood volume** may cause no disability, where as large volume is lost of 33% of blood volume, then acute haemorrhagic anemia and hypovolemic shock may develop. Loss of 50% blood volume over a period of

24 hours may not be necessarily fatal. Repeated minor haemorrhage may lead to slow leakage of blood and the final outcome is iron deficiency anaemia

- ☐ **Small haemorrhage** will not cause iron deficiency. Iron is retained in the body. RBCs broken down by macrophages and after few weeks, there will be a few macrophages filled with haemosiderin.
- ☐ **Large haemorrhage** may result in acute inflammation because of irritability of blood; even larger haemorrhages may lead to manifestation of jaundice.
- ☐ **Haematoma** is replaced by scar, if macrophages are present it usually contain hemosiderin remained in scar for few months or years
- ☐ **Subdural haematoma–** usually becomes cystic with a cavity filled with serous fluid surrounded by collagenous capsule

Congestion

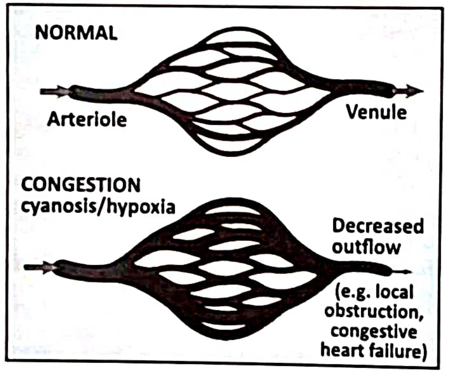


Fig 4.1: Congestion

The word congestion refers to the accumulation of blood in any blood vessels or chamber of the heart. In other words, increased volume of blood within dilated blood vessel of an organ or tissue.

Mechanism of congestion

- ⇨ **Active hyperemia–** usually physiologic, wherein increased volume from arterial and arteriolar dilatation
  - ☐ Inflammation of alveoli in pneumonia where congested vessels are present
  - ☐ Blushing i.e. flushing of the skin of the face in response to emotions
  - ☐ Menopausal flush
  - ☐ Muscular exercise
  - ☐ High grade fever
- ⇨ **Passive hyperemia–** where impaired venous drainage is the cause of congestion
  - ☐ **Acute–** occurs when outflow of blood is suddenly obstructed, e.g. in the patient afflicted with myocardial infarction, liver congestion and pulmonary oedema manifests as a sequel
  - ☐ **Chronic congestion–** persists for weeks or months
- ⇨ **Causes of congestion:**
  1. Left ventricular failure
  2. Right ventricular failure
  3. Carcinoma of lungs
  4. Deep vein thrombosis (DVT)
  5. Hernia (compression of gut)
  6. Cirrhosis of liver leading to portal hypertension

Clinical features of congestion

- ⇨ Depending upon the area and site involved in congestion

  For example, if there is congestion in liver associated with cirrhosis of liver, then the person is presented with complaints such as enlargement of abdomen, hematemesis, bleeding per rectum, nausea or vomiting, loss of appetite.
- ⇨ If there is congestion of left ventricle, then we can observe the clinical features of breathlessness of varying degree, cough with pink frothy sputum. If right atrium is congested, then we can see the clinical features such as pain in the right upper quadrant, ascites etc.

Thrombosis

Formation of solid plug from the constituents of blood anywhere in the intact cardiovascular system during life is called as thrombosis. In other words, it is the process of formation of solid mass in circulation from the constituents of flowing blood.

Causes of thrombosis

1. **Changes in the endothelium:** this may be due to physical trauma, burn, freeze, electric injury, chemical damage, bacterial toxins, inflammation of veins, atherosclerosis. Any neoplasm provokes platelet adhering and aggregation. This inturn initiates coagulation of blood and formation of fibrin.
2. **Alteration in blood flow:** slowing of the stream, turbulent and eddy currents, hyperviscosity of the blood
3. Alterations in the blood constituents

Patterns of clot formation

1. **Common pattern:** Platelet thrombus or white thrombus formed in moving blood stream which is progressive.
2. **Uncommon pattern:** Erythrocyte agglutination thrombus or hyaline thrombus formed only in capillaries as seen in mismatched transfusion, burns, frostbite and sickle cell disease. It is responsible for the slowness of blood stream. It is followed with platelet coagulation thrombus.
3. **Anatomical types:**
   - ⇨ **Occlusive thrombi:** Artery or vein which obstruct the lumen of the vessels completely.
   - ⇨ **Mural thrombi:** this can be seen in aorta or heart. There is no occlusion because of fast blood flow.
   - ⇨ **Disseminated thrombi:** occur in microvasculature.

Formation and growth of thrombus: Sticky endothelial damage invites platelet to adhere the damaged endothelium. Adherent platelets keep on growing in the form of arborescent strands and fuse to form glossy clumps. Later it is accompanied by intrinsic thromboplast which clots the plasma trapped between the platelet clumps. The deposition of fibrin strengthens the thrombus and anchors it to one side of the vessel wall. This small, flat, granular plaque is called as primary platelet thrombi.

Coralline thrombus: The rough surface of developing platelet thrombus acts further stimulus for platelet adhesion in another fibrin layer and entrapped RBC. This forms platelet plug and then coagulation cascade is triggered. As the bold flow past the platelet thrombi red cells are trapped in mesh and thrombus grows in layers on the direction of blood flow producing the wavy elevated ridges of platelets called lines of Zahn.

Occluding thrombus: As the thrombus growns it encroaches the lumen and obstructs the blood stream. Once the vessel is completely occluded, the blood flow ceases and the stagnant column of blood clots without production of any lines of Zahn. This is consecutive clot which is adhered to vessel wall through original thrombus and likely can embolise.

Propagated clot is that which may continue to the point of entry of next tributary in which platelet may arrive and adhere to clot. There can be formation of single long consecutive clot due to stagnant of blood behind the clot which is anchored to the wall only by the initial platelet plug. Endothelium can initiate both thrombogenic and anti thrombogenic stimuli.

Fate of thrombus

1. **Resolution:** Small mural thrombi shrink by retraction and are reabsorbed after being slowly lysed by the fibriolytic mechanism of blood and lytic enzymes from leucocytes incorporated in their bodies. Large amount of enzymes, activators of plasminogen present in plasma. Large amount of

enzymes, activators of plasminogen present in plasma. The activated plasmin is proteolytic enzyme and fibrinolytic in action which can explode and destroy itself. Clots intended for temporary haemostasis are destroyed immediately after their utilisation is over.

2. **Organisation:** depending upon the size of thrombus ultimately converted into fibrous plaque or fibrous nodule which may show haemosiderin, cholesterol cleft and calcium salts. Capillaries grow into the thrombus from the site of attachment and fibroblasts start invading the thrombus. Fibrovascular granulation tissue is formed which subsequently becomes dense and less vascular and is covered over by endothelial cells. The fibrosed thrombus may undergo hyalinisation and calcification and phleboliths are formed in pelvic veins.
3. **Propagation:** the thrombus may enlarge in size due to more and more deposition from the constituents of the blood. In this way, it may lead to complete occlusion of some important major blood vessel.
4. **Embolism:** The clot may run along the circulation to other branches and can occlude elsewhere by detaching from the vessel wall.

Embolism

Embolism is the process consisting of the impaction in some part of the vascular system of any undissolved material brought there by blood current. The impacted abnormal mass is termed as embolus (a plug).

The obstruction of a blood vessel by a foreign substance or a blood clot that travels through the blood stream, lodging in a blood vessel, plugging the vessel. Foreign substances that can cause embolisms include air bubbles, amniotic fluid, globules of fat, clumps of bacteria, chemicals such as talc and drugs. Blood clots are the most common cause of embolism.

Varieties of embolism

1. **Intravascular:** it can be produced by solid fragments of thrombi (septic/ aseptic) or atheromatous material.
2. **Extravascular:** A solid extra vascular embolus may be from normal tissue like marrow fragments, trophoblastic, decidual tissue, pancreatic tissue, cancer cells, clumps of bacteria, parasites, ova, cyst, pigmented granules, foreign bodies like cotton, silk, talc. Extra vascular embolus can be from any liquid element like fat globules, oil, amniotic fluid. Embolus also be produced from gases like any air or nitrogen.

Localisation of emboli: undissolved material carried in direction of flowing stream impacts in the vessel through which it cannot pass further.

1. Emboli originating in systemic veins goes to right heart from there it turns in pulmonary artery, from there it turns in pulmonary artery. This reaches to lungs to cause pulmonary embolism.
2. Embolus originating in pulmonary veins goes to left heart to reach aorta. From there, it can lodge anywhere in systemic arteries.
3. Emboli from portal trunk lodge in liver.

Systemic embolism: Cardiogenic emboli can block brain, kidney, spleen, lower limb. Ulcerated atherosclerotic plaque from carotid bifurication can reach brain and from abdominal aorta embolus can reach brain and from abdominal aorta embolus can reach lower limb. Such trash emboli often composed of atheromatous debris and cholesterol crystals are due to complication of major arterial surgery.

Paradoxical embolism: Venous embolus that gains access to arterial side through a heart wall defect.

Retrograde embolism: Carriage of an embolism in a direction reversed to the usual flow of lymph or blood. A sharp increase in pressure within cavities as during coughing or vomiting causes reversal of blood flow to enable blood from the lung to reach brain. Also from pelvic and abdominal region to reach spinal cord or brain.

Effects of embolism: This depends upon nature of embolism, size of vessel, amount of collateral circulation available and nature of organ.

- ⇨ Aseptic infarct or gangrene
- ⇨ Septic infarct or mycotic aneurysm
- ⇨ Metastasis if embolus contains tumour cells
- ⇨ Sudden death (if there is large sized arterial block)
- ⇨ Transient ischemic attack

Pulmonary embolism: One patient of every 5 with deep vein thrombosis (DVT) may present with the features of pulmonary embolism. Large sized embolism leads to sudden death. Medium sized embolism can cause pulmonary infarction. Silent micro emboli cause extensive patchy damage in lungs. This leads to chronic cor pulmonale pulmonary hypertension. Its clinical presentations are dyspnoea, chest discomfort and syncope.

Fat embolism: Fat droplets of more than 8 micrometers can cause embolism. The force of surface tension which gives fat droplets their spherical shape can well counteract the capillary blood pressure. The droplets cannot be deformed or cannot be squeezed out of capillaries. Fat embolism can be caused due to long bone fracture (due to disruption of fatty marrow), severe injury of subcutaneous tissue, deep burns, injection of oily solutions, pelvic injury during child birth, liposuction, fat necrosis from acute ether anaesthesia, gas gangrene. Fat globules enter torn vessels and give symptoms like respiratory distress, cerebral syndrome, petechiae in skin and mucosa.

Amniotic fluid embolism: Amniotic fluid contains mucin (meconium and foetal components), fat (sebaceous glands) desquamated epithelial cells (skin and lanugo hairs) they enter uterine sinusoids during labour and concealed accidental haemorrhage bypassing between the ruptured membrane wall to reach placental margin and produce pulmonary embolism, obstetrical shock and disseminated thrombosis.

Gas embolism: The gas embolus may be produced during surgery in neck, chest when large veins open up. It can also occur during cardiac operations, angiographic operations, blood transfusions or intravenous therapy, vaginal douching, induced abortion, insuffulation of fallopian tubes, induction of artificial pneumothorax, pneumoperitoneum or any laparoscopic procedures. Air enter vein and carried to right side of the heart. Here air and blood churn up into froth. This froth acts as air trap and block the entry of air into pulmonary artery. This leads to massive pulmonary embolism and sudden death. Nearly 100-150 ml of air is required to cause this effect. Arterial air embolism leads to blockage of cervical or coronary artery. In this small amount of air is sufficient to produce death.

Ischemia

Inadequate blood supply to a part of the body, even to the point of complete deprivation is ischemia. This inadequacy may be relative, a sudden demand for blood because of increased functional activity. Ischemia primarily affects components of higher oxygen requirement.

Causes of ischemia

- ⇨ Atherosclerosis, thrombosis, embolism, vasculitis, muscular spasm of vessel wall and external pressure are some of the important causes of ischemia
- ⇨ Generalised, diffused ischemia is caused by conditions such as hypovolemic shock and cardiac failure as a result of systemic hypotension. Ischemia of an organ or tissue may be caused by defects in arterial supply, the capillaries within that organ or the venous return.
- ⇨ The arterial cause of ischemia: Due to thrombosis, embolism, spasm of vessels

seen in Raynaud's disease, ergot poisoning, TAO, arteriosclerosis, polyarthritis nodosa, pressure from outside due to ligature, tourniquet, tight plaster.

⇨ The venous cause may be due to all above causes along with haematoma, strangulation. Venous ischemia is rarer as veins have more extensive anastomosis than arteries.

⇨ The ischemia in capillaries may be due to frost bite, haemolytic anemia (RBC agglutination), sickle cell disease, malaria, chronic myeloid leukemia, disseminated intravenous coagulopathy, decubitus bed sore.

⇨ Brain and heart are more vulnerable for anoxia. Anoxia for more than few minutes leads to severe damage. Retina and smaller cerebral arteries are end arteries as they do not have any anastomosing branch. There ischemia can be more dangerous to these organs than others.

Effects of ischemia: Ischemia produces damage to tissues through

1. Anoxia/ deprivation of oxygen
2. Deprivation of nourishment
3. Accumulation of waste products of metabolism

Changes after ischemia

1. Functional damage: Angina pectoris, intermittent claudication
2. Degeneration, atrophy
3. Fibrosis
4. Infarction

Factors determining extent of damage by ischemia

1. Anatomy of vasculature of affected area (collateral circulation)
2. Nature of affected tissue
3. Rate and degree of obstruction. Sudden obstruction has severe effect than gradual obstruction. In gradual obstruction, there is time for collateral circulation to develop.
4. Generalised disease affecting circulation

Infarction

This is usually due to sudden and complete deprivation of the blood supply. It is an area of necrosis produced by deprivation of blood supply. Non ischemic necrosis produced by physical, chemical bacteria etc are not infarct. Putrifaction is absent in infarction.

Causes: all causes of ischemia can cause infarction. It is due to arterial or venous obstruction, sudden blockage of artery, sudden fall of blood pressure distal to the point of block. The resultant anoxia leads to atonic dilatation of capillaries, venules and increased permeability of plasma and RBC that ooze out. Hence, ischemic area becomes swollen and hemorrhagic. Attempt of collateral circulation may reduce some amount of infarct. Failure to circulation leads to increased anoxia. This causes chemical injury because of accumulation of metabolites and hence results in necrosis.

Microscopic changes of infarction

⇨ Depletion of muscle glycogen

⇨ Clumping of nucleoplasm

⇨ Myofibrils show transverse tears

⇨ Increase in lactic acid

⇨ Swollen mitochondria

⇨ Degenerative changes in parenchymal cell appear within few hours

⇨ Necrosis will be evident in 48 hours

Gradually, the excess of blood in capillaries and veins is drained away. The oozed red cells are lysed and their haemoglobin is removed by diffusion. With these events infarct becomes pale. Products from the necrotic tissue irritate the surrounding living tissue and set up a zone of inflammation at the periphery.

Nature of infarction: pathologically infarction is an area of coagulative (firm) or colliquative (soft) necrosis. Infarcts are usually in periphery because the arteries of an organ generally branch out as fan like structure. Infarcts are commonly conical or pyramidal with base towards periphery and apex at the site of arterial obstruction. Various types of infarct like red infarct, pale infarct, septic infarct, aseptic infarct can be found.

Chapter Resources

1. Textbook of pathology by Harsha Mohan, 5th Edition, Jaypee brothers Publications, New Delhi, 2005
2. Website materials

Key points of the chapter

⇨ **Oedema:** Oedema is derived from Greek word. This is defined as abnormal and excess accumulation of fluid in the interstitial spaces and serous cavities. Hydropic degeneration is the term used if there is excess accumulation of fluid inside the cells. Pleural effusion, pericardial effusion, ascites are some of the examples of excess fluid accumulation in the serous cavities. Abnormal Sterling forces across the capillary membrane are responsible for the manifestation of oedema.

⇨ **Shock:** Shock is the clinical syndrome results from inadequate tissue perfusion irrespective of the cause. This usually results in the reduction in cardiac output and raised peripheral vascular resistance. Depending on the degree of severity, shock is divided into 3 stages – non progressive (compensated) stage, progressive stage irreversible stage. Depending upon the causative factor of shock, shock can be termed as hypovolemic shock, traumatic shock, cardiogenic shock, septic shock, neurogenic shock and hypoadrenal shock.

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⇨ **Hemorrhage:** Hemorrhage is derived from Greek word, means burst of blood. In other words, escape of blood from blood vessels. Bleeding can occur externally or internally into serous cavities (pleural cavity etc). Depending upon the amount of hemorrhages, the terms such as petechiae, ecchymosis, purpura, hematoma are used.

⇨ **Congestion:** The word congestion refers to the accumulation of blood in any blood vessels or chamber of heart. As far as mechanism of congestion is concerned, two types of congestion are named – active hyperemia and passive hyperemia. Certain causes of congestion are left ventricular failure, deep vein thrombosis etc.

- **Thrombosis:** formation of solid plug from the constituents of blood anywhere in the intact cardiovascular system during life. Fate of thrombus is either resolution or organization or propagation or embolism.
- **Embolism:** is the process consisting of the impaction of in some part of the vascular system of any undissolved material brought there by blood current. Certain mechanisms where embolism can happen are thromboembolic stroke, pulmonary embolism, fat embolism, gas embolism, amniotic fluid embolism etc.
- **Ischemia:** inadequate blood supply to any part of the body, even to the point of complete deprivation is ischemia. Most common cause of ischemia is atherosclerosis. Other causes of ischemia include thrombosis, embolism, muscle spasm of vessel wall.
- **Infarction:** area of necrosis produced by sudden and complete deprivation of blood supply. For example, myocardial infarction, renal infarction, cerebro vascular accident due to cerebral infarction.

Probable questions may be asked in the examination

Short essay

- Define oedema and explain the types of oedema
- Explain the pathophysiology of oedema
- Define hemorrhage and explain cerebral hemorrhage
- Define shock and explain the pathophysiology of shock
- Define congestion and explain the pathophysiology of congestion
- Define thrombosis and explain the pathophysiology of thrombosis
- Define thromboembolism explain the mechanism with suitable examples
- Define ischemia and infarction and explain the pathophysiology with examples
- Explain ischemia and infarction
- Ischemia – infarction
- Write in brief ischemia and infarction
- Thrombosis
- Write causes, signs and symptoms of thrombosis
- Oedema

Short answer

- Define oedema
- Define embolism
- Define infarction
- Define hemorrhage

MCQs

1. **Hydrostatic pressure in the capillary is responsible for**
   a. Movement of fluid from capillary to interstitial space;
   b. Movement of fluid from interstitial space to capillary;
   c. Movement of fluid from arterial end to venous end of the capillary;
   d. Movement of fluid from venous end to arterial end of the capillary

   Answer -(a)

2. **The example for non pitting type of oedema among the following is**
   a. Congestive cardiac failure;
   b. Chronic kidney disease;
   c. Alcoholic liver disease;
   d. Filariasis

Immunity and Autoimmunity and Immune Pathology

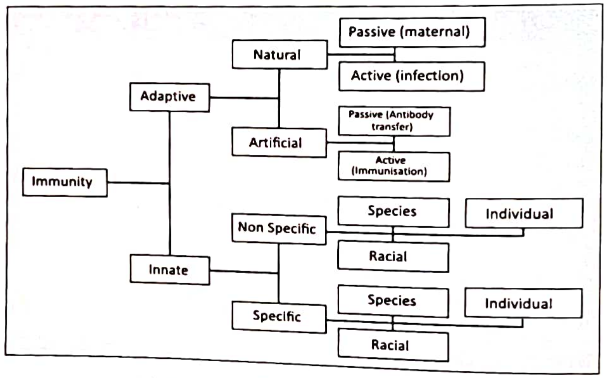
5

Learning objectives

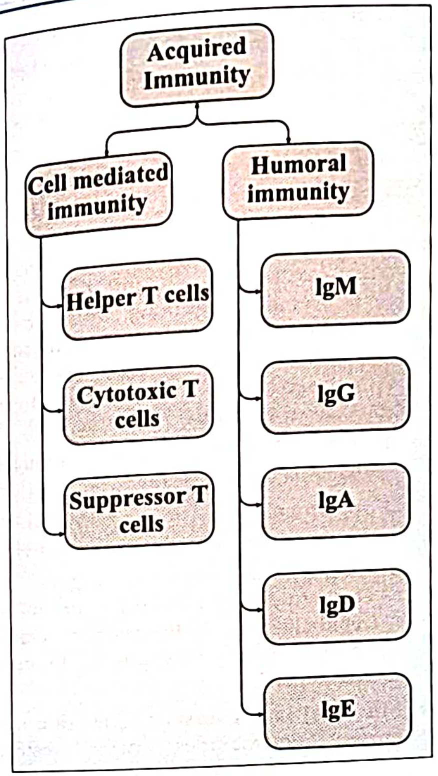
- ⇨ What is immunity?
- ⇨ What are the types of immunity with suitable examples
- ⇨ The defence mechanisms of the host leading to the immune reactions in the body
- ⇨ What do you mean by autoimmunity? Its current understanding with suitable example

The term 'immunity' traditionally refers to the resistance exhibited by the host towards injury caused by microorganisms and their products. It is the defence mechanism in which body attains resistance against the entry of antigen and prevent disease onset. It is evolved to recognise and to eliminate the foreign molecules through an integrated network of cellular and molecular interactions and thus providing the protection against the disease. The host defence mechanisms are

1. **Physical and chemical barriers:** skin, mucous membrane, gastric acid, lysosome, lacto ferritin
2. **Mechanical removal:** sneezing, coughing, secretion, ciliary action of respiratory mucosa
3. **Colonisation resistance:** normal flora preventing colonisation with pathogenic organisms.
4. **Immune response:** state of having sufficient biological defences to avoid infection, disease or other unwanted biological invasion. Immunity involves both specific and non-specific components. The non-specific components act either as barriers or as eliminators of wide range of pathogens irrespective of antigenic specificity. Other components of the immune system adapt themselves to each new disease encountered and are able to generate pathogen specific immunity.



Flowchart 5.1: Classification of immunity



Flowchart 5.2: classification of acquired immunity

Innate immunity:

is the resistance to infections which an individual possesses by virtue of his genetic and constitutional make up. It is not affected by prior contact with microorganism or immunisation. It may be non specific, when it indicates a degree of resistance to infections in general or specific where resistance to a particular pathogen is concerned.

Innate immunity may be considered at the level of the species, race or individual. Species immunity refers to the total or relative refractoriness to a pathogen, shown by all members of a species. For instance, all human beings are totally unsusceptible to plant pathogens and to many animal pathogens such as rinderpest or distemper. This immunity is something a person obtains by virtue of being a part of the human species.

Within a species, different races may show differences in susceptibility to infections. This is known as racial immunity. For example, there is high resistance to anthrax in Algerian sheep. The people of Negroid origin in USA are more susceptible to tuberculosis than Caucasians. The resistance to Plasmodium falciparum is seen in some parts of Africa and the Mediterranean cost.

The differences in innate immunity exhibited by different individuals in a race is known as individual immunity.

The factors that influence the level of innate immunity in an individual are

- ⇨ **Age:** The children and elderly people are most susceptible for infectious diseases than adults. Increased susceptibility in the young may show variation due to hormonal influence. Tinea capitis caused by Microsporum audouinii will spontaneously cured with the onset of puberty. The vaginal epithelium of prepubertal girls are more prone to the gonococcal infection. Some diseases like poliomyelitis and chickenpox tend to be severe in adults than in young children. Hepatitis B infection in the new born are usually asymptomatic as the new born children are having lack of immunity. Elderly people are highly susceptible for infections owing to waning of their immune responses.
- ⇨ **Hormonal influences:** Endocrine disorders such as diabetes mellitus, hypothyroidism and adrenal dysfunction are associated with enhanced susceptibility of infections. The high incidence of staphylococcal sepsis in diabetes may be related to increased carbohydrates in tissues. The presence of corticosteroids will depress the immune system in case of infection by their anti-inflammatory and antiphagocytic activity and by suppression of antibody formation and hypersensitivity. The elevated steroid

level in pregnancy may be related to increased susceptibility of infection in pregnant women.

- **Nutrition:** The people who are suffering from malnutrition are more susceptible for the ill effects of infections.

Mechanisms of Innate Immunity

- **Epithelial surfaces:**
  - The intact skin and mucous membrane covering the body protect it considerably against invasion by microorganisms. They provide much more than a mechanical barrier. Healthy skin possesses bactericidal activity to which the presence of high concentration of salt in the drying sweat, the sebaceous secretions and the long chain fatty acids and soaps contribute.
  - The mucosa of respiratory tract has several innate mechanisms of defence. The nose prevents the entry of microbes to a large extent, the inhaled particles are being checked at or near the nasal orifices. The air that passes after the nose are held by mucus lining the epithelium, and swept back to the pharynx where they tend to be swallowed or coughed out. The cilia present in the respiratory epithelial cells propel the foreign particles upward towards the nasal cavity. Nasal and respiratory secretions contain mucopolysaccharides capable of combining with influenza and other viruses. Particles that manage to reach alveoli are ingested by the phagocytic cells present in the alveoli.
  - Mouth contains saliva which has inhibitory effect on many microorganisms. Particles deposited in the mouth are swallowed and subjected to the action by the secretion of digestive juices. The high acidity of gastric juice is destroying almost all microorganisms. The pH becomes progressively alkaline from duodenum to ileum. The ileum contains a rich and varied flora and in the large intestine, the bulk of contents is composed of bacteria.
  - The conjunctiva is freed of foreign particles by flushing action of lachrymal secretions. The eyes become susceptible for the infections when lachrymal secretions are absent. Tears cotain antibacterial substance, lysozyme. It acts by splitting certain polysaccharide components of cell walls of susceptible bacteria.
  - The flushing action of urine eliminates bacteria from urethra.
  - Spermine and zinc present in the semen carry out antibacterial activity.
  - The acidity of adult vagina, due to fermentation of glycogen in the epithelial cells by the resident aciduric bacilli, makes inhospitable to many pathogens.
- **Microbial antagonisms:** The skin and mucous membranes have resident bacterial flora which prevent colonisation of pathogens. Alteration of normal resident flora may lead to invasion by extraneous microbes, causing serious diseases such as staphylococcal enterocolitis.
- **Cellular factors in innate immunity:** This is mediated by neutrophils and macrophages which engulf the microorganisms by the process of phagocytosis. These phagocytic cells reach the site of inflammation in large numbers, attracted by the process of chemotaxis and ingest the pathogenic materials. Among the lymphocytes, a special class named as natural killer cells are important in non specific defence against viral infections and tumours. They selectively kill virus infected cells and tumour cells.
- **Inflammation:** Tissue injury or irritation, initiated by the entry of pathogens or other irritants, leads to inflammation, which is an important body defence mechanism. The arterioles at the site constrict initially and then dilate leading to an increased blood flow. There is slowing of blood and margination of leucocytes, which escape into the tissues by diapedesis and accumulate in large numbers, attracted by the process of chemotaxis which are released at the site of injury. Microorganisms are phagocytosed and destroyed. There is an outpouring of plasma, which help to dilute the toxic products present in the area of the injury. A fibrin layer is laid, serving to wall off the site of infection.

- **Fever:** A rise of temperature noted following infection is another natural defence mechanism of the body. It not only helps to accelerate the physiological processes, but may in some cases, destroy the infecting pathogens. Fever stimulates the production of interferon and aids recovery from viral infections.
- **Acute phase proteins:** Infection or injury leads to the sudden raise of certain plasma proteins collectively known as acute phase proteins. These include C reactive protein (CRP), mannose binding proteins, alpha-1-acid glycoprotein, serum amyloid P component and many others. They are believed to enhance the host resistance, prevent tissue injury and promote repair of inflammatory lesions.

Acquired immunity:[1]

The resistance that an individual acquires during life is known as acquired immunity. It is of two types – active and passive.

- **Active immunity** is the resistance developed by an individual as a result of antigenic stimulus. It is also known as adaptive immunity as it represents an adaptive response of the host to a specific pathogen or other antigen. This involves the active functioning of host's immune system. Active immunity sets in only after a latent period which is required for the activation of person's immune system. During the development of active immunity, there is often negative phase during which the level of measurable immunity may actually lower than it was before the antigenic stimulus. This is because antigen combines with any pre-existing antibody and lowers its level in circulation. Once, developed, its life span is long lasting. If an individual who is previously immunised actively, is exposed to same antigen subsequently, then immune response occurs very quickly and abundantly than that of the first exposure. This is known as secondary response. This implies active immunity is more effective and better in terms of protection from antigens when compared to passive immunity.
- **Passive immunity** is the resistance transmitted passively to the recipient in a 'readymade' form is known as passive immunity. Here, the recipient's immune system plays no active role in the generation of immunity. There is not antigenic stimulus, in stead, in this type of immunity, preformed antibodies are administered to the person. There is no latent period in passive immunity. There is no negative phase. The immunity is transient, usually lasting for days or weeks, only till the passively transmitted antibodies are metabolised and eliminated.

GK

[1] The lymphocytes most extensively in the lymph nodes and in specialised lymphoid tissues such as spleen, submucosal areas of gastrointestinal tract, thymus and bone marrow. Lymphocytes are derived from pluripotent hematopoietic stem cells in embryo. Two types of lymphocytes are formed in the human body. They are T lymphocytes and B lymphocytes
Lymphocytes are preprocessed in the thymus gland and T lymphocytes are formed which are responsible for cell mediated immunity.
Lymphocytes prop rocessed in liver and bone marrow which are responsible for humoral immunity.
These are responsible for the production of immunoglobulins.

No secondary response can be observed in case of passive immunity.

Table 5.1: Differences between active immunity and passive immunity

Active Immunity	Passive Immunity
Produced actively by host's immune system	Received passively. No active host participation
Induced by infection or by immunogens	Readymade, antibody transferred
Durable effective protection	Transient, less effective
Immunity affective only after lag period	Immediate immunity
Immunological memory present	No memory
Booster effect on subsequent dose	Subsequent less effective
Negative phase may occur	No negative phase
No applicable in the immune deficient person	Applicable in immune deficient individual

Active immunity may be natural or artificial.

- ⇨ **Natural active immunity** results from either a clinical or an inapparent infection by a microbe. A person who has recovered from an attack of measles develops natural active immunity. In this type, the host's immune system prepares the antibodies which act on antigen of the pathogens, thereby leading to the antigen-antibody reaction, there by the person will have life long immunity. This type of natural active immunity is present in chicken pox, poliomyelitis, measles. In some viral diseases, such as influenza or common cold, the immunity is short lived. The immunity following bacterial infection, is generally less permanent when compared to viral diseases.
- ⇨ **Artificial active immunity** is the resistance induced by administration of vaccines. Vaccines are the preparations of live or killed microorganisms or their products for immunisation. E.g. of vaccines – live vaccines (BCG vaccine or OPV [oral polio vaccine - Sabin]), killed vaccines (cholera vaccine and injectable polio vaccine – Salk) and subunit vaccine (Typhoid VI antigen and Hepatitis B vaccine).
  - ❑ Live vaccines initiate an infection without causing any injury or disease. The immunity following live vaccine administration parallels that following natural infection though it may be of lower order. The immunity lasts several years but booster doses may be necessary. Live vaccines may be administered orally or parenterally.
  - ❑ Killed vaccines are generally less immunogenic than live vaccines, and protection lasts for short period.
- ⇨ **Natural passive immunity:** is the resistance passively transferred from mother to baby. In human infants, maternal antibodies[2] are transmitted predominantly through placenta. The human colostrum which is rich in IgA antibodies resistant to intestinal digestion, gives protection to neonate. The human fetus acquires some ability to synthesise antibodies (IgM) from about 20th week of life, but its immunological capacity is still inadequate at birth. It is only about the age of 3 months, the infants acquire some measure of immunological independence. Till the age of 3 months, maternal antibodies give passive protection against infectious diseases to the infant. Transport of antibodies across placent is an active process and therefore the concentration of antibodies in the fetal blood is sometimes much higher than that seen in mother.
- ⇨ **Artificial passive immunity:** is the resistance passively transferred to the recipient by the administration of the antibodies. The agents used for this purpose are hyperimmune sera of animal or human origin, convalescent sera and pooled human gamma globulin. These are used for prophylaxis and therapy. E.g. hyperimmune sera such as ATS (anti tetanus serum) prepared from hyperimmunised horses are employed in case of tetanus. Convalescent sera (sera of patients recovering from infectious diseases) contain high levels of specific antibody. Pooled human gamma globulin contains antibodies against all common pathogens prevalent in that region.

Autoimmunity

Autoimmunity is a condition in which structural or functional damage is produced by the action of immunologically competent cells or antibodies against the normal components of the body. Autoimmunity literally means protection against self but it actually implies injury to self.

Diseases of autoimmune (origin usually exhibit the following features:)

1. An elevated level of immunoglobulins
2. Demonstrable autoantibodies
3. Deposition of immunoglobulins or their derivatives at sites of election, such as renal glomeruli
4. Accumulation of lymphocytes and plasma cells at the sites of the lesion
5. Benefit from corticosteroid or other immuno suppressive therapy
6. The occurrence of more than one type of autoimmune lesion in an individual
7. A genetic predisposition towards autoimmunity
8. Incidence higher among females
9. Chronicity usually non reversible.

Mechanism of auto immunisation

- ⇨ Cells or tissues undergo antigenic alteration as a result of physical, chemical or biological influences. Physical agents such as irradiation can cause antigenic alteration. Photosensitivity and cold allergy may represent sensitisation to self antigens, altered by light and cold, respectively. Several chemicals including drugs, can combine with cells and tissues alter their antigenic nature[3].
- ⇨ Immunological damage result from immune responses by cross reacting foreign antigens.
- ⇨ Polyclonal B cell activation may occur leading to the enhanced formation of non specific antibodies which are usually IgM in nature.
- ⇨ Breakdown of immunological homeostasis may lead to cessation of tolerance and emergence of forbidden clones of immunocompetent cells capable of mounting immune response against self antigen.
- ⇨ Enhanced helper T cells and decreased suppressor T cells will occur.

Classification of autoimmune diseases

Based on the site of involvement and nature of lesions, autoimmune diseases may be classified as hemocytolytic, localised (organ specific), systemic (organ non-specific) and transitory diseases.

Hemocytolytic autoimmune diseases

Autoimmune hemolytic anemias: Autoantibodies against erythrocytes are demonstrable in this conditions. In this type of anemias, the red cells coated with antibodies are destroyed in the liver and spleen.

Autoimmune thrombocytopenia: autoantibodies directed against platelets occur in idiopathic thrombocytic purpura. This is traditionally considered as antibody mediated hypersensitivity.

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[2] Immunisation of pregnant women with tetanus toxoid is recommended as neonatal tetanus is common among the communities. Maternal antibodies will present at the birth will prevent the occurrence of tetanus in the neonates.

[3] Contact dermatitis is a type of delayed hypersensitivity due to an autoimmune response skin antigens altered by the combination with chemical allergens.

Autoimmune leucopenia: In this, non agglutinating antileucocyte antibodies are seen in the serum of patients with systemic lupus erythematosus and rheumatoid arthritis.

Localised (organ specific) autoimmune diseases

Autoimmune diseases of thyroid gland

1. **Hashimoto's disease:** occurs more frequently in females and associated with thyroid swelling and symptoms of hypothyroidism or frank myxoedema. Histologically, the glandular structure is replaced by lymphoid tissue consisting of lymphocytes, histiocytes and plasma cells. Antibodies which react with thyroglobulin, a second acinar colloid, microsomal antigen are seen in the thyroid gland.
2. **Thyrotoxicosis (Graves' disease):** The majority of the patients with thyrotoxicosis possess antibody to thyroglobulin. Lymphocyte infiltration is common in thyrotoxic glands.

Addison's disease: Lymphocytic infiltration of adrenal glands and presence of circulating antibodies directed against the cells of zona glomerulosa are observed.

Autoimmune orchitis: Lymphocytic infiltration of the testes and circulating antibodies to the sperms and germinal cells are observed in this situation.

Myasthenia gravis: In this disease, there is an abnormal fatiguability of muscles due to malfunction of myoneural junction. An antibody against acetyl choline receptor on myoneural junctions of striated muscles is present in these patients. This prevents acetyl choline from combining with its receptor, and impairs muscular contraction.

Pernicious anemia: Two types of autoantibodies are present in this condition. The first is directed against the parietal cells of gastric mucosa. This is responsible for the manifestation of achlorhydria and atrophic gastritis. The second type of autoantibodies is directed against intrinsic factor and prevents absorption of vitamin B12.

Guillain Barre Syndrome (Idiopathic polyneuritis): This is considered as autoimmune response against peripheral nervous tissue.

Systemic (non-organ specific) autoimmune disease: This group includes conditions characterised by immune response against a variety of self antigens and damage to several organs and tissue systems. The diseases classified under this category are systemic lupus erythematosus (SLE), rheumatoid arthritis, polyarteritis nodosa, Sjogren's syndrome, dermatomyositis, scleroderma.

Systemic lupus erythematosus (SLE): This is a chronic, multisystem disease with remissions and exacerbations, terminating fatally. Patients have a variety of antibodies directed against cell nuclei, intracytoplasmic cell constituents, immunoglobulins, thyroid and other organ specific antigens. As far as the diagnosis of the disease is concerned, immunoflorescent tests for antinuclear antibody (ANA) show up different patterns of staining such as homogenous (diffuse), peripheral (outline), speckled and nucleolar staining patterns. ANA tests may be positive, but are not specific to SLE, as they may be positive in many other autoimmune conditions, viral infections, chronic inflammatory diseases, aged individual and persons under certain medications.

Anti- DNA antibodies are tested by RIA or ELISA. Three major types of antibodies are seen – those reacting with single stranded (ss), double stranded (ds) and both ss and ds DNA. Of these, high titre of anti-ds DNA antibody is relatively specific for SLE.

Rheumatoid arthritis: This is symmetric polyarthritis with muscle wasting and subcutaneous nodules, commonly associated with serositis, myocarditis, vasculitis, and other disseminated lesions. It is found more commonly in females. The synovial membranes of affected joints are swollen and oedematous with dense infiltration of lymphocytes and plasma cells. Rheumatoid factor (RF), circulating autoantibody is seen in the blood of the patients of rheumatoid arthritis.

Sjogren's syndrome: This is a trial of conjunctivitis sicca, dryness of mouth with or without salivary gland enlargement and rheumatoid arthritis. This syndrome may occur in other collagen diseases. ANA antibodies and RF commonly observed in the sera of these patients.

Transitory autoimmune processes: These include the conditions such as anemia, thrombocytopenia or nephritis that follow certain infections or drug therapy. In such diseases, the disease is transient and undergoes spontaneous cure when the infection is controlled or the drug is withdrawn.

Immune Pathology

Immunity is considered to be protective mechanism of the human body against several antigens produced by various microorganisms or inflammatory processes. Abnormal functioning of the immune system can happen in two different ways: one hypo functioning of the immune system and hyper functioning of the immune system. Hypo functioning of the immune system manifest in many immune deficiency diseases and hyper functioning of the immune system can manifest in the form of hypersensitivity reactions.

Hypo functioning of the immune system: Immunodeficiency diseases are the conditions where the defence mechanisms of the body are hampered, leading to repeated microbial infections of varying severity and sometimes enhanced susceptibility to malignancies.

⇨ Deficiencies of the defence mechanisms may involve specific immune functions such as humoral immunity and cell mediated immunity or both or non-specific immune functions such as phagocytosis and complement, which augment and act in conjunction with specific immune responses.

⇨ Immunodeficiencies may be classified as

a. **Primary immunodeficiencies** resulting from abnormalities in the development of immune mechanisms

b. **Secondary immunodeficiencies**– consequences of disease, drugs, nutritional inadequacies and other processes that interfere with the proper functioning of the mature immune system.

a. **Primary immunodeficiencies** are those where in abnormalities in B cell responses, T cell responses or both B and T cell responses and disturbances of complement system and disturbances in the act of phagocytosis are observed. As primary immunodeficiencies occur to a lesser extent, the detailed description is not given in the current discussion.

b. **Secondary immunodeficiencies** are those that occur in malnutrition, malignancies, infections, metabolic disorders and cytotoxic drugs, AIDS. Secondary immunodeficiencies are more common when compared to primary immunodeficiencies.

- ☐ Deficiencies of humoral and cellular immune response may occur secondarily during many of the disease processes.
- ☐ Humoral deficiency may result from B cells are depleted as in lymphoid malignancy, chronic lymphatic leukemia in particular.
  - ☐ Immunoglobulin catabolism occurs in the patients of nephrotic syndrome
  - ☐ When excess loss of protein occurs as in exfoliative skin disease and protein losing enteropathies
  - ☐ Excess production of abnormal immunoglobulins in multiple myeloma
- ☐ Cell mediated immunity is depressed in lymphoreticular malignancies, as in Hodgkin's disease

- ☐ Obstruction to lymphatic circulation as in lymphorrhoeas
- ☐ In lepromatous leprosy, where thymus dependent areas of lymph nodes are infiltrated with non lymphoid cells
- ☐ Transiently, in case of viral infections such as measles
- ☐ Nutritional deprivation causes depletion of both kinds of responses

Hyper functioning of immune system

This kind of immune reaction sometimes injurious to host. Sensitised individuals respond to subsequent antigenic stimuli in an inappropriate manner, leading to tissue damage, disease or even death.

- ⇨ The term hypersensitivity is used injurious consequences in the sensitised host, following contact with specific antigens.
- ⇨ In the protective processes of immunity, the focus of attention is the antigen and what happens to the antigen, for e.g. killing of bacteria or neutralisation of a toxin. In hypersensitivity, antigens are of little concern, and often they are innocuous or bland substances such as proteins or pollen. Hypersensitivity is mainly concerned with what happens to the host as a result of immune reactions.
- ⇨ For the induction of hypersensitivity reactions, the host should have the contact with antigen (allergen). The initial contact sensitises the immune system leading to the priming of the appropriate B or T cell lymphocytes. This is known as sensitising or priming dose. Subsequent contact with antigen causes manifestation of hypersensitivity. This is known as shocking dose.

Classification of hypersensitivity reactions

2 types: Immediate delayed reactions.

1. **Immediate hypersensitivity** (B cell or antibody mediated)
   - ⇨ Anaphylaxis
   - ⇨ Atopy
   - ⇨ Antibody mediated cell damage
   - ⇨ Arthus phenomenon
   - ⇨ Serum sickness
2. **Delayed hypersensitivity** (T cell mediated)
   - ⇨ Infection (tuberculin) type
   - ⇨ Contact dermatitis type

4 types (as per Coombs and Gell in 1963) nowadays widely used

1. Type I (Anaphylactic, IgE or reagin dependent)
2. Type II (Cytotoxic or cell stimulating)
3. Type III (Immune complex or toxic complex disease)
4. Type IV (Delayed or cell mediated hypersensitivity)

Table 5.2: Differences between immediate hypersensitivity and delayed hypersensitivity

Immediate hypersensitivity	Delayed hypersensitivity
Appears and recedes rapidly	Appears slowly, lasts longer
Induced by antigens or haptens by any route	Antigen or hapten intradermally or with Freund's adjuvant or by skin contact
Circulating antibodies present and responsible for reaction; antibody mediated reaction	Circulating antibodies may be absent and not responsible for reaction; cell mediated reaction
Passive transfer possible with serum	Cannot be transferred with serum; but possible with T cells or transfer factor
Desensitisation is easy, but short lived	Difficult, but long lasting

Table 5.3: Types of immune reactions

Type of reaction	Clinical syndrome	Time required for manifestation	Mediators
Type I: IgE type	1. Anaphylaxis 2. Atopy	Minutes	IgE: histamine and other pharmacological agents
Type II: Cytotoxic and cytolytic	Antibody mediated damage – hemolytic anemia, thrombocytopenia, agranulocytosis	Variable, hours to days	IgG, IgM, C
Type III: Immune complex	1. Arthus reaction 2. Serum sickness	Variable hours to days	IgG, IgM, C
Type IV: Delayed hypersensitivity	1. Tuberculin 2. Contact dermatitis	Hours to days	T cells, lymphokines, macrophages

Type I hypersensitivity reaction

Anaphylaxis – this is defined as a state of rapidly developing immune response to tan antigen to which the individual is previously sensitised. Within minutes of exposure to allergic event, the person will develop the clinical presentation.

Causes of anaphylactic reaction are

- ☐ Administration of anti sera such as anti tetanus serum
- ☐ Administration of penicillin
- ☐ Sting by wasp or bee

The effects of the pathological events are

- ☐ Increased vascular permeability
- ☐ Smooth muscle contraction
- ☐ Early vasoconstriction followed by vasodilatation
- ☐ Shock
- ☐ Increased gastric secretion
- ☐ Increased nasal and lacrimal secretions.

- ⇨ **The clinical examples of anaphylaxis are of 2 types – systemic or local**
  - ☐ Clinical features of **systemic anaphylaxis** are itching, erythema, contraction of respiratory bronchioles, diarrhoea, pulmonary oedema, pulmonary haemorrhages, shock and death
  - ☐ Clinical features of **local anaphylaxis** are
  - ☐ Hay fever (seasonal allergic rhinitis) due to pollen sensitisation of conjunctiva and nasal passages
  - ☐ Bronchial asthma due to allergy to inhaled allergens like house dust
  - ☐ Food allergy to ingested allergens like fish, cow's milk
  - ☐ Cutaneous anaphylaxis due to contact of antigen with skin characterised by urticaria, wheal and flare.
  - ☐ Angioedema characterised by laryngeal oedema, oedema of eyelids, lips, tongue and trunk
- ⇨ **Atopy** – this usually occurs in the patients suffering from hay fever or bronchial asthma. The antigens commonly involved in atopy are pollen, house dust or certain ingestants such as eggs, milk.
- ⇨ This occurs mainly due to IgE activation.
- ⇨ The clinical expression of atopic reactions is usually determined by the portal of entry of the antigen – conjunctivitis, rhinitis, gastrointestinal symptoms and dermatitis following exposure through eyes, respiratory tract, intestine or skin. Sometimes, the clinical manifestations are observed in remote areas of portal of entry for example, urticarial rashes in the skin.

Type II reaction:

These reactions involve a combination of IgE and IgM to a lesser extent, antibodies with antigenic determinants on the surface of the cells leading to cytotoxic and cytolytic effects.

- The term cytotoxic reaction is defined as the reaction which cause cell injury to the cell by combining humoral antibodies with cell surface antigens; blood cells being affected more commonly. The term cytolysis refers to the destruction of cells.
  - Autoimmune haemolytic anemia in which RBC destruction brought by auto antibodies reacting with antigens present in surface of RBC
  - Transfusion reactions due to incompatible or mismatched blood transfusion
  - Erythroblastosis fetalis in which fetal RBCs are destroyed by maternal isoantibodies crossing the placenta.
  - In Grave's disease (primary hyperthyroidism), thyroid autoantibody is formed which reacts with TSH receptor to cause hyperfunction and proliferation.
  - In myasthenia gravis, antibody to acetylcholine receptors of skeletal muscles is formed which blocks the neuromuscular transmission at the motor end plate, resulting in muscular weakness.

Type III reaction:

This type of hypersensitivity leads to the tissue damage due to complement activation and release of inflammatory molecules. This results from the formation of immune complexes by direct antigen-antibody (Ag-Ab) combination as a result of which complement system gets activated causing cell injury. This leads to increased vascular permeability and infiltration of the site with neutrophils.

- **Arthus reaction:** initial exposure to etiological factor will not cause any local reaction, but subsequent exposure leads to intense local reaction associated with oedema, induration and haemorrhagic necrosis. E.g. exposure to hay or grain resulting in farmer's lung.
- **Serum sickness:** this is the systemic form of type III hypersensitivity. The clinical syndrome consists of fever, lymphadenopathy, splenomegaly, arthritis, glomerulonephritis, endocarditis, vasculitis, urticarial rashes, abdominal pain, nausea and vomiting. E.g. disseminated malignancies and autoimmune conditions such as SLE, polyarteritis nodosa, scleroderma, rheumatoid arthritis, dermatomyositis.

Type IV reaction:

Delayed hypersensitivity: constitute one aspect of cell mediated immune response. These are typically provoked by intracellular microbial infections or haptens like simple chemicals applied to the skin, evolve slowly and consist of a mixed cellular reaction involving lymphocytes and macrophages in particular.

- **Tuberculin type:** this is caused by injecting a small dose of tuberculin intradermally in an individual sensitised to tuberculoprotein by prior infection or immunisation. An indurated inflammatory reaction develops at the site within 48-72 hours. This is mediated by specifically sensitised CD4+ T cell subpopulation on contact with antigen.
  - This type of hypersensitivity develops in many infections with bacteria, fungi, viruses and parasites, especially when the infection is subacute or chronic and the pathogen is intracellular. A similar type of hypersensitivity also seen in allograft reaction and in many autoimmune diseases.
- **Contact dermatitis type:** delayed type of reaction develops from skin contact with variety of chemicals – metals such as nickel and chromium, simple chemicals like dyes, drugs such as penicillin. This is presented with lesions varying from macules and papules to vesicles that break down, leaving behind raw weeping areas typical of acute eczematous reaction.

Chapter Resources

1. Textbook of microbiology by Ananthanarayan and Panicker – 7th edition by C K J Panicker
2. Textbook of pathology by Harsh Mohan – 5th editionedition, Jaypee Brothers, New Delhi, 2005
3. Textbook of medical physiology by Arthur C Guyton and John E Hall – 11th Edition, Saunders Publication, 2006

Key points of the chapter

- **Immunity** is the term used to describe the resistance exhibited by the host towards the injury caused by microorganisms and their products. This is the defense mechanism in which body attains resistance against the entry of antigen and prevents disease onset. Several host mechanisms will provide defense mechanism are physical barriers such as skin, mucous membrane, gastric acid etc, mechanical removal such as sneezing etc; colorization resistance where in normal flora preventing colonization with pathogenic organisms.
- **Immunity is of 2 types–** innate and adaptive. Innate immunity is one where in resistance is seen for certain microorganisms since birth. Adaptive immunity is one where individual develops resistance after the exposure to antigenic stimulus. Further immunity is of 2 types – active and passive. Active immunity is one where antigen antibody reaction takes place inside the body and passive immunity is one where we are going to transfer the active antibodies into the host itself.
- **Autoimmunity** is a condition in which structural and functional damage is produced by the action of immunologically competent cells or antibodies against the normal components of the body. Autoimmunity literally means protection against self but it actually implies injury to self.
- **Hypersensitivity reactions:** 2 types – immediate and delayed hypersensitivity reactions. Immediate hypersensitivity reactions are seen in anaphylaxis, atopy, serum sickness etc. and delayed hypersensitivity reactions are seen in tuberculin infection and contact dermatitis.
- 4 types of hypersensitivity reactions are nowadays widely practiced.
  - Type I – (Anaphylactic, IgE dependent)
  - Type II – (Cytotoxic or cell stimulating)
  - Type III – (Immune complex or toxic complex disease)
  - Type IV – (Delayed or cell mediated hypersensitivity)

Probable questions may be asked in the examination

Long essays

- Explain Vyadhikshamatva and immunity and write the factors which influence Vyadhikshamatva and immunity

Short essays

- What is immunity and explain the types of immune immunity
- Explain innate immunity with examples
- Hypersensitivity

- ⇨ Explain the types of hypersensitivity reactions
- ⇨ Autoimmune disease
- ⇨ Explain autoimmunity with examples
- ⇨ Explain the difference between active and passive immunity

Short answers

- ⇨ Define immunity
- ⇨ What is active immunity?
- ⇨ What is atopy?
- ⇨ What is anaphylaxis reaction?
- ⇨ Enumerate the types of immunity
- ⇨ What is serum sickness?

MCQs:

1. **Which of the following is categorized under cell mediated immunity?**
   a. IgM;
   b. IgG;
   c. IgE;
   d. Cytotoxic T cells
   Answer -(d)
2. **Which of the following is not an example for physical and chemical barriers?**
   a. Coughing;
   b. Skin;
   c. Gastric acid;
   d. Lysosome
   Answer -(a)
3. **Hashimoto's disease involves which of the following organ?**
   a. Stomach;
   b. Thyroid gland;
   c. Spinal cord;
   d. Cerebellum
   Answer -(b)
4. **Serum sickness is included in ....type of hypersensitivity.**
   a. Type I;
   b. Type II;
   c. Type III;
   d. Type IV
   Answer -(c)
5. **Anaphylaxis is ....type of hypersensitivity.**
   a. Type I;
   b. Type II;
   c. Type III;
   d. Type IV
   Answer -(a)
6. **Which of the following regarding anaphylaxis is incorrect?**
   a. Type I hypersensitivity reaction;
   b. IgE mediated hypersensitivity;
   c. Hypersensitivity occurs within minutes;
   d. IgG mediated hypersensitivity
   Answer -(d)
7. **Which of the following is not an autoimmune disease?**
   a. Rheumatoid arthritis;
   b. Guillian Barre syndrome;
   c. Systemic Lupus Erythematosus;
   d. Gout
   Answer -(d)
8. **Which of the following is/are autoimmune disease/s?**
   a. Myasthania gravis;
   b. Grave's disease;
   c. Pernicious anemia;
   d. All of the above
   Answer -(d)
9. **Anti Tetanus Serum is an example of**
   a. Natural active immunity;
   b. Natural passive immunity;
   c. Artificial active immunity;
   d. Artificial passive immunity
   Answer -(d)
10. **Which of the gland is involved in Sjogren's syndrome?**
    a. Thyroid gland;
    b. Salivary gland;
    c. Adrenal gland;
    d. Pituitary gland
    Answer -(b)

***

Neoplasm

6

Learning objectives

- ⇨ To know the meaning of neoplasms
- ⇨ To understand the rationale behind the nomenclature of neoplasms
- ⇨ To know the types of neoplasms
- ⇨ To know the differences between benign and malignant tumours
- ⇨ To understand the clinical features of neoplasms

Definition of neoplasm[1]

An abnormal mass of tissue, the growth of which exceeds and is unco-ordinated with that of normal tissues and persists in the same excessive manner after the cessation of the stimuli which evoked the change. In short, a mass of tissue formed as a result of abnormal, excessive, unco-ordinated, autonomous and purposeless proliferation of cells is neoplasm.

All neoplasms depend on the host for their nutrition and blood supply. Some neoplasms require endocrine support and such dependencies can be exploited to the disadvantage of the neoplasm.

The study of neoplasms is being termed as oncology. Commonly neoplasms are termed as tumours. They may be either benign (slow growing and localising without causing much difficulty to the host) or malignant (when they proliferate rapidly, spread throughout the body and may eventually cause the death of the host). The common term used for all malignant tumours is cancer. The word cancer means crab, thus reflecting the true character of cancer since it sticks to the part stubbornly like a crab.

Nomenclature of the neoplasm

- ⇨ **Oma**–benign tumour; e.g. fibroma–benign tumour of fibrous tissue; chondroma – benign tumour of cartilage, depending on the tissue, nomenclature of the benign tumour is made
- ⇨ **Sarcoma**– malignant tumour of mesenchyma; e.g. fibrosarcoma–malignant tumour of fibrous tissue; chondrosarcoma – malignant tumour of cartilage
- ⇨ **Carcinoma**–malignant tumour of epithelial tissue

There are certain exceptions to the nomenclature of tumours.

- ☐ **Melanoma**– carcinoma of melanocytes
- ☐ **Hepatoma**– carcinoma of hepatocytes
- ☐ **Lymphoma**– carcinoma of lymphoid tissue
- ☐ **Seminoma**– carcinoma of testicular tissue
- ☐ **Leukemia**– carcinoma of blood forming cells

Structure: two types of cells– parenchymal

GK [1] Manifestation of neoplasm is influenced by nine modifiable risk factors.

1. Smoking
2. Alcohol consumption
3. Obesity
4. Physical inactivity
5. Low fruit and vegetable consumption
6. Unsafe sexual intercourse
7. Air pollution
8. Indoor smoke from household fuels
9. Contaminated injections

cells and supporting cells

⇨ **Parenchymal cells–** comprises proliferating tumour cells, these tissues determine the nature and evolution of tumour cells.

⇨ **Supporting cells** – comprises fibrous connective tissue, blood vessels, host derived inflammatory cells, these tissues will provide the framework on which parenchymal tumour cells grow.

Table 6.1: Differences between benign and malignant tumours

Benign tumours	Malignant tumours
Clinical features	
Boundary less – encapsulated and circumscribed	Poorly circumscribed and irregular
Surrounding tissues – usually tissues compressed	Surrounding tissues – invaded
Size - small	Size – often larger
Secondary changes – less often	Secondary changes – more often
Microscopic features	
Pattern – usually resemble the tissue of origin closely	Poor resemblance to tissue of origin
Basal polarity – retained	Basal polarity – often lost
Pleomorphism – not present	Pleomorphism – often present
Anisonucleosis – absent	Anisonucleosis – present
Mitosis – may be present, but always typical mitosis	Mitotic figures increased and are generally atypical and abnormal
Functions – usually well maintained	Functions may be retained, lost or abnormal
Growth rate – slow	Grow rate – rapid
Local invasion – absent	Local invasion – present
Metastasis – absent	Metastasis – present
Prognosis – local complications	Death by local and metastatic complications

Benign: When its microscopic and gross characters are considered to be relatively innocent which implies remain localised, cannot spread to other sites and is amenable to local surgical removal and patient generally survives. Slow growing, localised without causing much difficulty to the host.

Malignant: Otherwise termed as cancer. They adhere to any part that they seize in an obstinate manner similar to the crab's behaviour, implies it invades and destroys adjacent structures and spread to distant parts of the body leading to death of the suffering individual. They proliferate rapidly, spread through out the body.

Metastasis: Metastasis is defined as spread of tumour by invasion in such a way that discontinuous secondary tumour mass/ masses formed at the site of lodgement. Metastasis and invasiveness are distinct features which differentiate from benign tumours. Benign tumours do not metastasise while almost malignant tumours can metastasise.

Route of metastasis: In general, carcinomas metastasise by lymphatic route and sarcomas metastasise by hematogenous route. However, sarcomas may also spread by lymphatic route.

1. **Lymphatic spread–** Malignant cells proliferate and lymphatic system may be afflicted in two forms:

⇨ **Lymphatic permeation–** In this mechanism, the walls of lymphatics are readily invaded by cancer cells and may form continuous growth in the lymphatic channels. For example, in case of carcinoma of breast, involvement of axillary lymph nodes; in case of carcinoma of thyroid gland, involvement of lateral cervical lymph nodes; in case of bronchogenic carcinoma, involvement of hilar and paratracheal lymph nodes are seen.

⇨ **Lymphatic emboli** – In this mechanism, the malignant cells may detach from the parental tissue, to form tumour emboli so as to be carried along the lymph to the next draining lymph node. For example, in the patients suffering from cancers of the abdominal organs such as stomach, gall bladder, colon, the tumour cells get dislodged from the parental malignant tissue, spread via lymphatic channels, thereby metastasis occurs in the left supra clavicular region. The involvement of lymph node in the left supraclavicular region is termed as Virchow's node.

2. **Hematogenous spread–** common sites for blood borne metastasis are liver, lungs, brain, bones, kidney and adrenal glands. However, a few organs such as spleen, heart and skeletal muscle do not allow tumour metastasis to grow.

⇨ For example, systemic veins drain blood into vena cavae from limbs, head, neck and pelvis. Therefore the concers from these sites metastasise into lungs.

⇨ Portal veins drain the blood from the small and large intestine, spleen, pancreas into the liver. Thus, tumours of these organs frequently lead to metastasis in liver.

⇨ Carcinoma of the lungs metastasise by pulmonary arterial route to kidneys, adrenal glands, bones and brain etc.

⇨ Retrograde hematogenous spread after venous obstruction, just after lymphatic metastasis for example, vertebral metastasis in cancers of thyroid and prostate.

3. **Local spread–** malignant tumours will infiltrate, invade and destroy the surrounding tissue. During progression of the malignant tumour, it may extend to surrounding tissue spaces and permeate the lymphatics, blood vessels, perineural spaces and may penetrate the bones too. For example, the malignant tumour of the liver may spread to the gall bladder, stomach, right pleural cavity or vertebra etc. similarly, the carcinoma of the stomach may spread to the liver, pancreas, bone etc.

4. Spread along body cavities and natural passages

⇨ **Transcoelomic spread–** certain cancers invade through fragments or clusters of tumour cells break off to be carried in the coelomic fluid and implanted elsewhere in the body cavity. Peritoneal cavity is involved most of the occasions and pleural and pericardial cavities are affected occasionally. The examples of this nature of spread are

❑ Carcinoma of stomach seeding to both ovaries (Kruckenberg tumour)

❑ Carcinoma of ovary spreading to the entire peritoneal cavity without infiltrating the underlying organs

❑ Carcinoma of the bronchi and breast seeding to the pleura and pericardium

⇨ **Spread along the epithelial lined surfaces–** this type of spread is unusual for a malignant tumour to spread along the epithelium lined surfaces because intact epithelium and mucous coat are quite resistant to penetration by tumour cells.

❑ From endometrium to ovaries via fallopian tubes or vice versa

❑ From bronchus to alveoli

❑ From kidneys to lower urinary passages via ureter

⇨ **Spread via cerebrospinal fluid–** malignant tumour of the ependyma and leptomeninges may spread by release of tumour fragments and tumour cells into CSF and produce metastasis at other sites in the central nervous system.

⇨ **Implantation–** rarely, a tumour may spread by surgeon's scalpel, needles, sutures or may be implanted by direct contact such as transfer of cancer of the lower lip to apposing upper lip.

Clinical features of neoplasm

⇨ **Local effects-** Depending upon the size of the tumour or location of the tumour, clinical features may vary.

❑ **Compression–** many benign tumours pose only a cosmetic problem. Some other benign tumours such as pituitary adenoma may lead to endocrine disturbances; a small benign tumour at ampulla of Vater may lead to biliary obstruction.

- ☐ **Mechanical obstruction–** benign and malignant tumours of alimentary canal may cause small and large intestinal obstruction.
- ☐ **Tissue destruction–** malignant tumours, either primary or secondary tumours may lead to the destruction of tissues by invasion or infiltration.
- ☐ **Infarction, ulceration, hemorrhage–** cancers have greater tendency to undergo infarction, surface ulceration and hemorrhage than benign tumours. Secondary bacterial infection may be associated. Large tumours in mobile organs (e.g. ovarian tumours) may undergo torsion and produce infarction and hemorrhage.

⇨ **Cancer cachexia –** patients with advanced and disseminated terminal cancers have emaciation, anorexia together referred as cancer cachexia. Other various causes of cancer cachexia include necrosis, ulceration, hemorrhage, infection, malabsorption, anxiety, pain, insomnia, hypermetabolism and pyrexia.

⇨ **Fever –** fever of unexplained origin may be a presenting feature in some malignancies such as Hodgekin's disease, osteosarcoma etc. Probable cause of fever can be considered as ulceration and exposure of these ulcers to various microorganisms.

⇨ **Paraneoplastic syndromes–** these are the group of conditions developing in patients with advanced cancer which are neither explained by direct and distant spread of the tumour nor by the usual hormone elaboration by the tissue of the origin of tumour. Certain examples of this category are

- ☐ **Endocrine syndrome–** elaboration of hormones or hormone like substances by cancer cells of non endocrine origin is called as ectopic hormone production.

  For example, in Cushing's syndrome, in around 10% of the patients suffering from bronchogenic carcinoma, may have the glucocorticoid secretion from the malignant cells.

  Secretion of erythropoietin by certain tumours such as renal cell carcinoma, hepatocellular carcinoma may have polycythemia.

- ☐ **Gastrointestinal syndrome–** malabsorption of various dietary components and hypoalbuminemia may be associated with variety of cancers which do not directly involve small intestine.

Prognosis in neoplasm

Grading and staging of cancer: these are the two systems to determine the prognosis and choice of treatment after a malignant tumour is detected.

⇨ Grading is defined as the macroscopic and microscopic degree of differentiation of the tumour and staging means extent of spread of the tumour within the patient.

⇨ **Grading –** cancers may be graded grossly and microscopically. Gross features like exophytic or fungating appearance are indicative of less malignant growth than diffusely infiltrating tumours. However, grading is largely based on two important histological features – degree of anaplasia and the rate of growth.

- ☐ **Grade I–** well differentiated (less than 25% of the anaplastic cells)
- ☐ **Grade II–** Moderately differentiated (25-50% of the anaplastic cells)
- ☐ **Grade III–** moderately differentiated (50-75% of the anaplastic cells)
- ☐ **Grade IV–** poorly differentiated or anaplastic (more than 75% of the anaplastic cells)

⇨ **Staging–** the extent of spread of cancers can be assessed by 3 ways – by clinical examination, by investigations and by pathological examination of the tissue removed. Two important staging systems currently followed are TNM statging and AJC staging.

⇨ **TNM staging –** developed by the UICC (Union Internationale Contre Cancer, Geneva). T refers to primary tumour, N refers to regional lymph node involvement and M refers to distant metastasis). For each of the 3 components namely, T,N and M, numbers are added to indicate the extent of the involvement.

⇨ **AJC staging (American Joint Committee)** divides all cancers into stages 0 to 4 and takes into account all 3 components of preceding system i.e. TNM system)

Table 6.2: TNM classification of tumours

Primary tumour	
T0	No evidence of primary tumour
T is	Carcinoma in situ
T1, T2, T3, T4	Increasing size and/ or local extension of primary tumour
Tx	Primary tumour cannot be traced
Regional lymph nodes	
N0	No regional lymph node metastasis
N1, N2, N3	Increasing number and extent of lymph node involvement
Nx	Regional lymph nodes cannot be assessed
Metastasis	
M0	No distant metastasis
M1	Distant metastasis present

Diagnosis of cancer: When the diagnosis of the cancer is suspected on clinical examination and on other investigations, it must be confirmed. The most reliable and certain method of diagnosis of cancer is histological examination of biopsy. The methods of laboratory methods of cancer are as follow:

1. **Histological examination –** this is based on microscopic examination of properly fixed tissue (excised tumour mass or open/ needle biopsy from the mass) supported with complete clinical and investigation data. The tissue must be fixed in 10% formalin solution for light microscope examination and in glutaraldehyde for electron microscope studies, while quick frozen section and hormonal analysis are carried out on fresh unfixed tissues.
2. **Cytological methods –** these consists of study of cells shed off into body cavities and study of cells by putting a fine needle introduced under vacuum into the lesion. For example, Pap smear test for the diagnosis of carcinoma of the cervix; FNAC (Fine Needle Aspiration Cytology) for the diagnosis of abdominal tumours and pelvic tumours.
3. **Electron microscopy–** to note cell junctions, cell surface, cell shape, shape of the nucleus, nucleoli and cytoplasmic organelles etc can be assessed.
4. **Tumour markers (biochemical assays)–** these are helpful in making the pathological diagnosis of the tumour and for prognostic and therapeutic assessment of the patient suffering from cancer. For example, assessment of AFP (Alpha Fetoproteins), PSA (Prostate Specific Antigen), Immunoglobulins, HCG (Human Chorionic Gonadotropin) etc

Chapter Resources

1. Textbook of pathology by Harsha Mohan, 5th Edition, Jaypee brothers Publications, New Delhi 2005
2. Harrison's principles of internal medicine by Anthony S Fauci et al, 17th edition, McGraw Hill publications, New York, 2008

Key points of the chapter

- ⇨ **Neoplasm** is defined as abnormal mass of tissue formed as a result of abnormal, excessive, unco-ordinated, autonomous and purposeless proliferation of cells.
- ⇨ All neoplasms depend on the host for their nutrition and blood supply. Commonly neoplasms are termed as **tumours.**
- ⇨ **The study of neoplasms is termed as oncology.** They are benign (slowly growing and localizing without causing much difficulty to the host) and malignant (tumour which proliferate rapidly, spread throughout the body and may eventually cause death).
- ⇨ **Malignant tumours** are commonly called as cancer.
- ⇨ **Metastasis** is the specific character of malignant tumour. Metastasis is defined as spread of tumour by invasion in such a way that discontinuous secondary tumour mass/ masses formed at the site of lodgement. Metastasis can occur either via local spread or lymphatic spread or hematogenous spread or spread along body cavities or natural passages.
- ⇨ **Gold standard** for the diagnosis of malignant tumour is biopsy, tissue of which is being examined under microscopic examination.

Probable questions may be asked in the examination

Short essays

- ⇨ Define neoplasm and explain the differences between the benign and malignant tumours
- ⇨ Define neoplasm and explain the characters of malignant tumours
- ⇨ Define metastasis and explain the metastasis in detail with suitable examples
- ⇨ Explain the grading and staging of neoplasm with examples
- ⇨ Explain the clinical features of neoplasm
- ⇨ What are the general clinical features of malignant diseases?

Short answers

- ⇨ Define neoplasm
- ⇨ Define metastasis
- ⇨ What do you mean by cachexia?

MCQs

1. **Sarcoma is the malignant tumour involving**
   a. Epithelial tissue;
   b. Connective tissue;
   c. Muscular tissue;
   d. Nervous tissue
   Answer -(b)
2. **Which of the following is not the example of malignant tumour?**
   a. Seminoma;
   b. Hepatoma;
   c. Melanoma;
   d. None of the above
   Answer -(d)
3. **Virchow's node is the lymph node enlargement seen in which part of the body?**
   a. Left inguinal region;
   b. Left axillary region;
   c. Left supraclavicular region;
   d. Right axillary region
   Answer -(c)
4. **In the assessment of TNM staging, the term N refers to**
   a. Tumour;
   b. Lymph node;
   c. Metastasis;
   d. All of the above
   Answer -(b)
5. **Gold standard for the diagnosis of malignant tumour is**
   a. Autopsy;
   b. Biopsy;
   c. X ray;
   d. MRI
   Answer -(b)

***

7

Introduction to Nutritional Disorders – Macro and Micro Nutrients

Learning objectives

- ⇨ To know brief idea about nutritional disorders
- ⇨ To know the brief idea about macronutrients and micro nutrients

Nutritional status of a society depends upon status of the socioeconomic conditions. The nutrients in the diet are grouped into essential and non essential nutrients.

Essential nutrients are 6 basic groups– proteins, fats, carbohydrates, vitamins, minerals and water.

Essential nutrients

1. **Proteins:** Dietary proteins provide the body with amino acids for protein synthesis. 1 gram of protein provide 4 kcal of energy. Eight amino acids (isoleucine, leucine, lysine, methionine, phenylalanine, theonine, tryptophan and valine) and histine must be supplied by diet. These 8 amino acids are not synthesised in the body.
2. **Fats:** Fats and fatty acids (linolenic, linoleic and arachidonic acid) should comprise 35% of diet with increased ration of poly-unsaturated to saturated fats so to minimise the risk of atherosclerosis. 1 gm of fat yields 9 kcal of energy.
3. **Carbohydrates:** These are the major source of energy. 1 gm of carbohydrate yields 4 kcal of energy.
4. **Vitamins:** These are mainly derived from exogenous dietary sources and are essential for maintaining the normal structure and function of the cells. Vitamin deficiencies result in individual deficiency syndromes or may be a part of multiple deficiency state.
5. **Minerals:** A number of minerals like iron, calcium, phosphorus, certain trace elements e.g. zinc, copper, selenium, iodine, chlorine, sodium, potassium, magnesium, manganese, cobalt, molybdenum etc are essential for health. These deficiencies show typical clinical presentation or syndromes.
6. **Water:** Water intake is essential to cover the losses in faeces, urine, sweat, exhalation to avoid dehydration.

Non essential nutrients

Are dietary fibre composed of cellulose, hemicellulose, pectin, though considered non-essential, are important due to beneficial effects in colonic cancer, diabetes mellitus, coronary artery disease, and lowering incidence of colonic cancer.

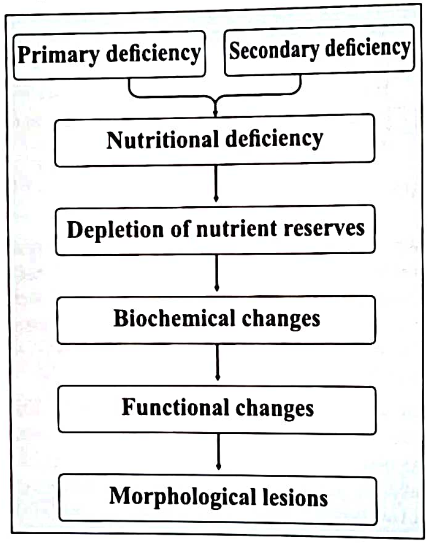
Pathophysiology of deficiency diseases: The nutritional deficiency disease develops when the essential nutrients are not provided to the cells adequately. The nutritional deficiency are of two types:

1. **Primary deficiency:** This is either due to lack or decreased amount of essential nutrients in the diet.
2. **Secondary deficiency:** Secondary or conditioned deficiency is malnutrition occurring as a result of various factors. These are

- ⇨ Interference with digestion: e.g. gastrointestinal disorders, neuropsychiatric illness, anorexia, alcoholism, food allergy, pregnancy

- ⇨ Interference with absorption: e.g. gut hypermotility, achlorhydria, biliary disease
- ⇨ Interference with utilisation: e.g. liver dysfunction, malignancy, hypothyroidism
- ⇨ Increased excretion: e.g. lactation, perspiration, polyuria
- ⇨ Increased nutritional demand: e.g. fever, pregnancy, lactation, hyperthyroidism.

Irrespective of the type of nutritional deficiency (primary or secondary) nutrient reserves in the tissues begin to get depleted, which initially result in biochemical alterations and eventually lead to functional and morphological changes in tissues and organs.



Flowchart 7.1: nutritional deficiency diseases

Starvation: Starvation is a state of overall deprivation of nutrients. It can be caused by

- ⇨ **Deliberate fasting** – religious or political
- ⇨ Famine conditions in a country or community
- ⇨ Secondary undernutrition such as due to chronic wasting diseases such as infections, inflammatory conditions, liver diseases, cancer etc.

A. starved individual has lax, dry skin, wasted muscles and atrophy of internal organs.

Metabolic changes

1. **Glucose:** Glucose stores of the body are sufficient for one day's metabolic needs only. During fasting state, insulin independent tissues such as brain, blood cells and renal medulla continue to utilise glucose while insulin dependent tissues such as muscle stop taking glucose. This leads to the release of glycogen stores of liver to maintain normal blood glucose level. Subsequently, hepatic gluconeogenesis from other sources such as breakdown of protein takes place.
2. **Proteins:** Protein stores and the triglycerides of adipose tissue have enough energy for about 3 months in an individual. Proteins breakdown to release amino acids which are used as fuel for hepatic gluconeogenesis so as to maintain glucose needs of the brain. This leads to nitrogen imbalance due to excretion of nitrogen compounds such as urea.
3. **Fats:** after about one week of starvation, protein breakdown is decreased, triglycerides of adipose tissue to from glycerol and fatty acids. The fatty acids are converted to ketone bodies in the liver which are used by most organs including brain in place of glucose. Starvation can then continue till all the body fat stores are exhausted following which death occurs.

Protein energy malnutrition

The inadequate consumption of protein and energy as a result of primary dietary deficiency or conditioned deficiency may cause loss of body mass and adipose tissue, leading to protein energy malnutrition (PEM) or protein calorie malnutrition (PCM).

The spectrum of clinical syndromes produced as a result of PEM includes

1. **Kwashiorkar:** related to protein deficiency though calorie intake may be sufficient.
2. **Marasmus:** is starvation infants occurring due to overall lack of calories.

The following table is showing the clinical difference between kwashiorkor and marasmus.

Table 7.1: Differences between Kwashiorkar and Marasmus

Features	Kwashiorkar	Marasmus
Definition	Protein deficiency with sufficient calorie intake	Starvation in infants with overall lack of calories
Clinical features	Occurs in children between 6 months and 3 years of age	Common in infants under 1 year of age
	Growth failure	Growth failure
	Wasting of muscles but preserved adipose tissues	Wasting of all tissues including muscles and adipose tissues
	Oedema, localised or generalised present	Oedema absent
	Enlarged fatty liver	No hepatomegaly
	Serum proteins are low	Serum proteins are low
	Anemia is present	Anemia is present
	Flag sign – alternate bands of light (depigmented) and dark (pigmented) hair	Monkey like face, protuberant abdomen, thin limbs
Morpho-logy	Enlarged fatty liver	No fatty liver
	Atrophy of different tissues and organs but subcutaneous fat preserved	Atrophy of different tissues and organs including subcutaneous fat

Disorders of vitamins

Vitamins are organic substances which cannot be synthesised within the body and are essential for maintenance of normal structure and function of the cells.

- ⇨ In developing countries, multiple deficiencies of vitamins and other nutrients are common due to generalised malnutrition of dietary origin. In developed countries, individual vitamin deficiencies are noted, children, adolescent, pregnant and lactating women, in particular and in some due to poverty.
- ⇨ Chronic alcoholism is one of the major cause of vitamin deficiency.

Vitamins are conventionally divided into two groups–

1. Fat soluble
2. Water soluble.

1. **Fat soluble vitamins:** Vitamin A, D, E and K are fat soluble vitamins. They are absorbed from intestine in the presence of bile salts and intact pancreatic function. Their deficiencies occur more readily due to secondary factors.
2. **Water soluble vitamins:** Vitamin B complex group and C are water soluble vitamins. These vitamins are more readily absorbed from small intestine. Deficiency of these vitamins is mainly due to primary deficiency. Being water soluble, these vitamins are easily lost due to cooking or processing of food.

Table 7.2: Vitamin deficiencies and clinical features

Fat soluble vitamins	Deficiency disorders
Vitamin A (Retinol)	Occular lesions (night blindness, xerophthalmia, keratomalacia, Bitot's spots, blindness)
	Other lesions (squamous metaplasia of respiratory epithelium, urothelium and pancreatic ductal epithelium, subsequent anaplasia, retarded bone growth)

Vitamin D (Calcitriol)	Rickets[1] in growing children; osteomalacia in adults, hypocalcemic tetany
Vitamin E	Degeneration of neurons, retinal pigments, axons of peripheral nerves, denervation of muscles, reduced cell life span; sterility in male and female animals
Vitamin K	Hypoprothrombinaemia (in haemorrhagic disease of new born, biliary obstruction, malabsorption, anticoagulant therapy, antibiotic therapy, diffuse liver disease)

Water soluble vitamins	Deficiency disorders
Vitamin C	Scurvy[2] (haemorrhgic diathesis, skeletal lesions, delayed wound healing, anemia, lesions in teeth and gums)

Vitamin B complex	Deficiency disorders
Thiamine (Vitamin B_1)	Beriberi[3] (dry or peripheral neuritis, wet or cardiac manifestations, cerebral or Wernicke Korsakoff syndrome)
Riboflavin (vitamin B_2)	Ariboflavinosis (ocular lesions, cheilosis, glossitis, dermatitis)
Niacin (Nicotinic acid)	Pellagra (dermatitis, diarrhoea, dementia)
Pyridoxine (vitamin B_6)	Vague lesions (convulsions in infants, dermatitis, cheilosis, glossitis, sideroblastic anemia)
Folate (folic acid)	Megaloblastic anemia[4]
Cyanocobalamin (vitamin B_{12})	Megaloblastic anemia, pernicious anemia[5]

GK

[1] Rickets results from decrease of calcium or phosphate in the ECF. If the child is adequately exposed to sunlight, 7-dehydroxycholesterol in the skin becomes activated by the ultraviolet rays and forms vitamin D which prevents rickets by promoting calcium and phosphate absorption from intestines.
Rickets will be responsible for weakening of bones and may be responsible for pathological fractures.

[2] Clinical features of scurvy are failure of wounds to heal, cessation of bone growth, bleeding from different sites.
Wound healing may require several months in stead of several days in case of vitamin C deficiency.
This is caused by failure of the cells to deposit collagen fibrils and intercellular cement substances. As a result of collagen deficiency, epiphysis of bone tissue tend to grow and no new collagen is laid between the bone cells and ossification will not occur.
In blood vessels, the walls become fragile, due to failure of endothelial cells to be cemented together properly and failure to form collagen fibrils, normally present in vessel walls.
In extreme scurvy, lesions of gums, teeth, infections of mouth, hematemesis and bleeding per rectum may be seen.

[3] Thiamine deficiency causes decreased utilisation of pyruvic acid by the tissues, but increased utilisation of fats. We know that CNS tissues entirely depends upon carbohydrate for energy. In thiamine deficiency, carbohydrate utilisation reduces by 50 – 60% and is replaced by utilisation of ketone bodies derived from fat. They can cause degeneration of myelin sheaths of nerve fibres in central nervous system and peripheral nervous system leading to polyneuritis.
A person with severe thiamine deficiency, develops cardiac failure due to weakness of cardiac muscle. Venous return of the blood to heart may increase 2 to 3 times than normal. This occurs due to the peripheral vaso dilatation through out circulatory system owing to decreased release of metabolic energy in the tissue. Peripheral oedema and ascites may be sequel to cardiac failure.

[4] In this type of anemia, RBCs grow large in size, with odd shapes and are called as megaloblasts. It may occur due to the lack of absorption of vitamin B12, folic acid and intrinsic factor from gastric mucosa. This may occur even in patients of tropical sprue.

[5] In pernicious anemia, there will be deficiency of intrinsic factor secretion from gastric mucosa. This is secreted by parietal cells which secrete HCl. When parietal cells are destroyed in chronic gastritis, the person is unable to absorb vitamin B12 from ileum. In the absence of intrinsic factor only 1/50th of vitamin B12 is absorbed from ileum. This leads to the manifestation of pernicious anemia.

Trace elements

Several minerals in trace elements are essential for health since they form components of enzymes and cofactors for metabolic functions. Besides calcium and phosphorus required for vitamin D manufacture, others include iron, copper, iodine, zinc, selenium, manganese, nickel, chromium, molybdenum, fluorine. However, out of these, the dietary deficiency of first five trace elements is associated with deficiency states.

- ⇨ **Iron:** Microcytic hypochromic anemia
- ⇨ **Copper:** Muscle weakness, neurologic defect
- ⇨ **Iodine:** Goitre, hyperthyroidism
- ⇨ **Zinc:** Growth retardation, infertility
- ⇨ **Selenium:** Myopathy, cardiomyopathy

Obesity: this is a condition results out of dietary imbalance and overnutrition. Obesity is defined as an excess of adipose tissue that imparts health risk; a body weight of 20% excess over ideal weight for age, sex and height.

Etiology of obesity: It results when dietary intake exceeds utilisation.

1. Inadequate pushing of oneself away from the dining table causing overeating.
2. Insufficient pushing of oneself out of the chair leading to inactivity and sedentary life style
3. Genetic predisposition to develop obesity
4. Diets largely derived from carbohydrates and fats than protein rich diet.
5. Certain other diseases such as hypothyroidism, Cushing's disease, insulinoma etc.

Sequelae of obesity

- ⇨ Cerebro vascular accident
- ⇨ Hypoventilation syndrome
- ⇨ Coronary artery disease
- ⇨ Hypertension
- ⇨ Fatty liver and non alcoholic liver cirrhosis
- ⇨ Cholelithiasis
- ⇨ Osteoarthritis
- ⇨ Atherosclerosis
- ⇨ Diabetes mellitus
- ⇨ Cancer

Chapter Resources

1. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers Publication, New Delhi, 2005
2. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders Publications, 2006

Key points of the chapter

- ⇨ Essential nutrients are of 6 basic groups –
  a. Proteins
  b. Fats
  c. Carbohydrates
  d. Vitamins
  e. Minerals
  f. Water
- ⇨ As far as the pathophysiology of deficiency diseases are of two types– primary deficiency and secondary deficiency. Both types of deficiency will lead to depletion of nutrient reserves which in turn result sequentially into changes in biochemical level, functional changes and morphological lesions.
- ⇨ **Protein energy** malnutrition commonly observed are kwashiorkor and marasmus.
- ⇨ **Vitamins** are organic substances that cannot be synthesized within the body.

Deficiencies of these substances result in various ailments in the human body. Chronic alcoholism is one of the major causes of vitamin deficiency. Vitamins A, D, E and K are fat soluble vitamins and vitamins B and C are water soluble vitamins. Ocular manifestations are observed in vitamin A deficiency; rickets is seen in the vitamin D deficiency, scurvy is seen in vitamin C deficiency and bleeding diatheses in vitamin K deficiency and degenerative neurological disease and sterility in vitamin E deficiency; beriberi in vitamin B 1 deficiency.

⇨ **Obesity** is the clinical condition where energy input is much more than energy output; body weight 20% more than ideal weight for particular age, gender and height. Coronary atherosclerosis, hypertension, osteoarthritis, diabetes mellitus etc are the sequelae of obesity.

Probable questions may be asked in the examination

Short essays

⇨ Explain in brief about the diseases manifested due to deficiency of macro and micro nutrients

⇨ Classify vitamins and explain in brief about vitamin deficiency diseases

⇨ Explain obesity and explain the clinical features of obesity

⇨ Explain protein energy malnutrition

⇨ Describe endocrine disorder in short

Short answers:

⇨ Write a short note on rickets

⇨ Write a short note on obesity

⇨ Write a short note on scurvy

⇨ Write a short note on night blindness

⇨ Write a short note on beriberi

⇨ Vitamin D deficiency

⇨ Write vitamin C deficiency disorder

⇨ Write signs and symptoms of vitamin C deficiency

MCQs

1. **Scurvy is manifested in individual due to the deficiency of**

   a. Vitamin A;
   b. Vitamin C;
   c. Vitamin E;
   d. Vitamin K

   Answer -(c)

2. **Beriberi is manifested due to the deficiency of**

   a. Vitamin B1;
   b. Vitamin B2;
   c. Vitamin B6;
   d. Vitamin B12

   Answer -(a)

3. **Vitamin D deficiency will lead to the manifestation of**

   a. Xerophthalmia;
   b. Rickets;
   c. Bleeding diatheses;
   d. Beriberi

   Answer -(b)

4. **The deficiency of cyanocobalamin (vitamin B12) will lead to the manifestation of**

   a. Beriberi;
   b. Scurvy;
   c. Megaloblastic anemia;
   d. Pernicious anemia

   Answer -(d)

5. **Bitot's spots are the signs seen in which part of the body?**

   a. Skin;

   b. Oral cavity;
   c. Eyes;
   d. Nasal cavity

   Answer -(c)

6. **Which of the following vitamin is not fat soluble?**

   a. Vitamin A;
   b. Vitamin D;
   c. Vitamin K;
   d. Vitamin C

   Answer -(d)

7. **The deficiency of which of the following trace elements is responsible for the manifestation of infertility?**

   a. Iodine;
   b. Copper;
   c. Zinc;
   d. Iron

   Answer -(c)

8. **Thiamine is also known as**

   a. Vitamin B1;
   b. Vitamin B2;
   c. Vitamin B6;
   d. Vitamin B12

   Answer -(a)

9. **The average amount of water lost in the urine in 24 hours is**

   a. 800 ml;
   b. 1,500 ml;
   c. 500 ml;
   d. 100 ml

   Answer -(b)

10. **1 gm of fat will yield ....amount of energy.**

   a. 4 kcal;
   b. 9 kcal;
   c. 1 kcal;
   d. 15 kcal

   Answer -(b)

***

Introduction to Infections

8

Learning objectives

- To know the brief description about infections
- To know the different terminologies we come across under the heading of infections
- To know the factors influencing the infections

- **Infection and immunity** involve interaction between the host (animal or human body) and the infecting microorganism.
- **Infection** is distinct from inflammation. Infection is the pathological process initiated by the invasion into the body by harmful microbes and their ill effects by toxins generated by these microbes. Whereas inflammation is the pathological event happening as a protective response by the body.
- **Microorganisms** or also termed as microbes namely, bacteria, viruses, fungi and parasites are present everywhere – in the soil, water, atmosphere and on the body surfaces, and are responsible for the manifestation of various infectious diseases in human beings. Based on their relationship to their hosts, microorganisms can be classified as saprophytes and parasites.
    - **Saprophytes (sapro in Greek – decayed and phyton – plant)** – these are freel living microbes that subsist on dead or decaying organic matter. They are found in soil and water and play an important role in the degradation of organic materials in nature. They are generally incapable of multiplying on living tissues and therefore are of little significance as far as human beings are concerned.
    - Parasites are the microbes that can establish themselves and multiply in the hosts.
- Some microorganisms are distributed throughout the world and some are limited to certain geographical regions only.
- Tropical and underdeveloped or developing countries are specifically afflicted by infectious diseases than developed countries. E.g. tuberculosis, leprosy, typhoid, cholera, malaria, amoebiasis, pneumonia etc.
- Probable reasons for the increased incidence of infectious diseases across the world are
    - Development of newer and antibiotic resistant strains of microorganisms
    - Administration of immunosuppressive therapy to patients with malignant diseases and transplanted organs exposed to opportunistic infections
    - Increased number of patients reporting to hospitals for different ailments exposed to hospital acquired infections
    - Person suffering from acquired immunodeficiency syndrome
- Infectious diseases are the consequence of inter relationship between disease producing properties of microorganisms and host-defence capability against the invading microorganism.
- Certain terminologies used in the microbiology:
    - **Primary infection–** initial infection with a parasite or microorganism in a host
    - **Reinfection–** subsequent infections by the same parasite in the host
    - **Secondary infection–** when a new parasite sets up an infection in a host whose resistance is lowered by a pre-existing infectious disease.
    - **Focal infection–** condition where due to infection or sepsis at localised sites such as appendix or tonsil, generalised are produced.
    - **Cross infection–** when a patient is already suffering from a disease or new infection is set up from another host or another external source.
    - **Nosocomial infection–** when cross infections occurring in the hospital is termed as nosocomial infection
    - **Iatrogenic infection–** physician induced infections resulting from investigative, therapeutic and other procedures.
    - **Endogenous infection–** when the source of infection is from the host's own body
    - **Exogenous infection–** when the source of infection is from external sources
- Depending upon the clinical effects generated by the infectious agents, certain other terms are used
    - **Inapparent infection–** where the clinical effects of the infectious disease are not apparent or evident. It is also termed as subclinical infection.
    - **Atypical infection–** is the name of the infectious disease where typical or characteristic clinical manifestation of the particular infection are not present.
    - **Latent infection–** some parasites after entry into the human body may remain in the tissues in a latent or hidden form proliferating and producing clinical disease when the host defence is compromised.

Factors relating to infectious agents

1. **Mode of entry:** Microorganisms causing diseases in the human beings may enter into the body through various routes.

- **Through ingestion (external route)–** this route usually lead to the infections related to alimentary canal. Contaminated foods and drinks will lead to the spread of infection. For example, cholera, typhoid, food poisoning or dysentery.
- **Through inoculation (parenteral route)–** some microbes may be inoculated directly into the tissues of the host. For example, entry of tetanus spores into the body via trauma to the skin or entry of hepatitis B or AIDS virus via injection or blood transfusion.
- **Through inhalation (respiration)–** respiratory infections will spread via this route. In this way of entry, microbes shed into the environment either by coughing or sneezing or clearing the throat or speaking. Here, large drops of such secretions will fall into the ground and dry in that space. In this environment, the microbes will remain suspended for longer periods and thereby will spread the infection by inhalation of these microbes into the healthy individuals. For example, influenza and tuberculosis
- **Through perinatally (vertical transmission)–** transmission of the infection from mother to the fetus. For example, TORCH (Toxoplasmosis, Rubella, Cytomegalovirus and Herpes simplex virus) infection

By direct contact (contagious infection) which may be direct or indirect.

- ⇨ **Direct contact:** Sexually transmitted diseases such as syphilis and gonorrhoea spread by direct contact. The term contagious disease is used for the diseases transmitted by direct contact.
- ⇨ **Indirect contact:** indirect contact may be through the contact of fomites (inanimate objects such as clothing, pencils or toys etc) which may be contaminated by pathogen which will act as vehicle for transmission of infection. E.g. transmission of diphtheria
- ⇨ **By contaminated water,** food, soil, environment or from animal host

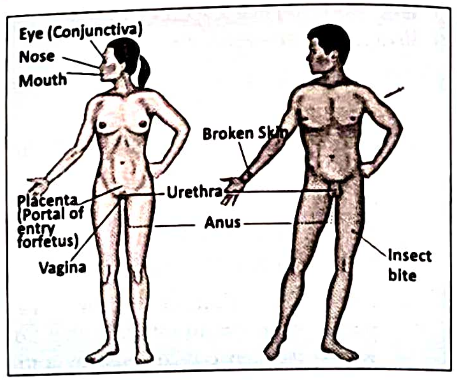
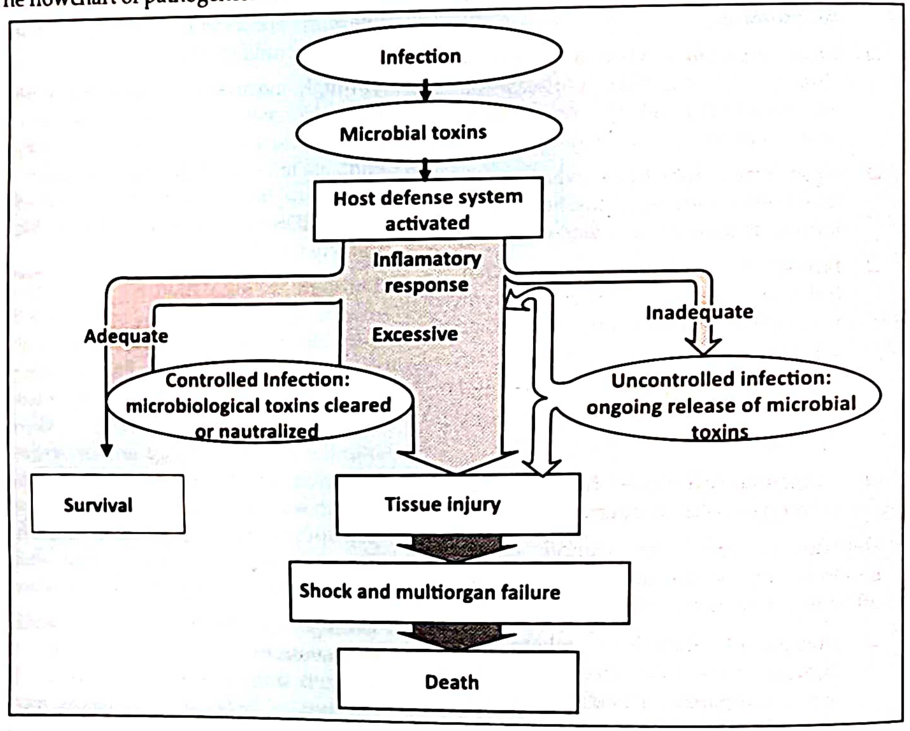


Fig 8.1: Showing the routes of entry of microorganisms into the human body

The flowchart of pathogenesis of infection shows the various processes happening inside the body.


Infection
Microbial toxins
Host defense system activated
Inflamatory response
Adequate
Excessive
Inadequate
Controlled Infection: microbiological toxins cleared or nautralized
Uncontrolled infection: ongoing release of microbial toxins
Survival
Tissue injury
Shock and multiorgan failure
Death

Flowchart 8.1: Pathogenesis of infections

2. **Spread of infection:** Microorganisms after entering the body may spread further through phagocytic cells, blood vessels and lymphatics.

3. **Production of toxins:** Bacteria liberate toxins which have effects on cellular metabolism. Endotoxins are released on lysis of bacterial cell while exotoxins are secreted by bacteria and have effects in different parts of the body.
4. **Virulence of organism:** Many species or strains of organisms may have varying degree of virulence on the body.
5. **Product of organisms:** some organisms produce enzymes that help in spread of infections in the body. E.g. hyaluronidase by Cl. Welchii, streptokinase by streptococci etc.

Factors relating to host: microorganisms invade the human body when the defences are not adequate. These factors include

1. **Physical barrier:** A break in the continuity of the skin and mucous membranes allows the microorganisms to enter the body.
2. **Chemical barrier:** mucus secretions of oral cavity and the alimentary tract and gastric acidity prevent bacterial colonisation.
3. **Effective drainage:** the natural passages of hollow organs like respiratory, gastro intestinal, urinary and genital system provide a way to drain the secretions effectively. Similarly, the ducts of various are the conduits of drainage of secretions. Obstructions in any of these passages may make a way for the proliferation of microorganisms in the body.
4. **Immune defence mechanisms:** These include phagocytic leucocytes of blood (polymorphs and monocytes), phagocytes of the tissues and immune system.

General clinical features of infection

- ⇨ **Fever and chills** – this is the commonest symptom observed when any microorganism enters the body. This occurs due to the interaction of the pathogen produced by the infectious agent and antibodies generated by the host. The raise of temperature may be either local or general. This may depend upon the virulence of the infection.
- ⇨ Other symptoms may be related to system afflicted by the infectious agent. For example, if the microbe enters the respiratory system, the person may be presented with running nose, nasal blockage, headache, heaviness of the head, pain in the ears, hoarseness of the voice, chest discomfort, sputum or haemoptysis. If the microbe enters the alimentary canal, the person may present with symptoms such as nausea, vomiting, pain abdomen, diarrhoea, anorexia etc. Thus, depending upon the nature of the entry of the organism, virulence of the organism, host-microbe interaction, clinical symptoms may vary.

Table 8.1: Vitamin deficiencies and clinical features Names of different infections and infectious agents

S.No.	Disease	Infectious agent
1.	Typhoid (enteric) fever	Salmonella typhi
2.	Plague	Yersinia pestis
3.	Anthrax	Bacillus anthracis
4.	Whooping cough (pertussis)	Bordetella pertussis
5.	Chancroid	Haemophilus ducreyi
6.	Granuloma inguinale	Calymmatobacterium donovani
7.	Gonorrhoea	Neisseria gonorrhoeae
8.	Cholera	Vibrio cholerae
9.	Shigellosis	S. Dysenteriae, S. flexneri, S. Boydii, S. Sonnei
10.	Diphtheria	Corynobacterium diphtheriae
11.	Lobar pneumonia	Streptococcus pneumoniae, Staphylococcus aureus, Haemophillus influenzae, Kleibsiella pneumoniae
12.	Broncho pneumonia	Staphylococci, Streptococci, K. pneumoniae, H. influenzae

S.No.	Disease	Infectious agent
13.	Bacterial meningitis	Escherichia coli, H. influenzae, Neisseria meningitidis, Streptococcus pneumoniae
14.	Bacterial endocarditis	Staphylococcus aureus, Streptococcus viridans
15.	Tuberculosis	Mycobacterium tuberculosis
16.	Hansen's disease	Mycobacterium leprae
17.	Syphilis	Treponema pallidum
18.	Tetanus	Clostridium tetani
19.	Urinary tract infections	Escherichia coli
20.	Acquired Immuno Deficiency Syndrome	Human Immunodeficiency Virus
21.	Chickenpox	Varicella zoster
22.	Malaria	Plasmodium species

Methods of identification: The organisms causing infections and parasitic infestations can be confirmed by various methods. The methods are explained as below:

1. **Bacteria:**
   - ⇨ **Gram stain** – most bacteria
   - ⇨ **Acid fast stain** – mycobacteria, nocardia
   - ⇨ **Giemsa stain** – campylobacteria
2. **Fungi:**
   - ⇨ **Silver stain** – most fungi
   - ⇨ **Periodic acid Schiff (PAS):** most fungi
   - ⇨ **Mucicarmine:** cryptococci
3. **Parasites:**
   - ⇨ **Giemsa** – malaria, leishmania
   - ⇨ **Periodic acid Schiff (PAS):** amoebae
   - ⇨ **Silver stain** – pneumocystis
4. **All classes** including viruses
   - ⇨ Culture
   - ⇨ In situ hybridisation
   - ⇨ DNA analysis
   - ⇨ Polymerase chain reaction (PCR)

Chapter Resources

1. Textbook of microbiology by Ananthnarayan and Panicker, 7th Edition, Orient Longman Publications, Hyderabad, 2005

Key points of the chapter

- ⇨ Infection is distinct from inflammation. Infection is the pathological process initiated by the invasion into the body by harmful microbes and their ill effects by toxins generated by these microbes. Whereas inflammation is the pathological event happening as a protective response by the body.
- ⇨ Infection and immunity involve interaction between the host and infecting microorganism. Microorganisms are bacteria, viruses, fungi and parasites.
- ⇨ Microorganisms enter into the body via ingestion (cholera, typhoid, food poisoning and dysentery) or inoculation (tetanus, hepatitis B and AIDS) or inhalation (influenza, tuberculosis, COVID-19) or perinatal transmission (TORCH infection)
- ⇨ General features of infection include fever and chills and depending upon the involvement of system in case of infection. For example, if the person is suffering from respiratory infection, he may be presented with fever along with cough, sputum production along with fever and chills.

Probable questions may be asked in the examination

Short essays

- ⇨ Define infection and explain the mechanisms of entry of infectious organsims
- ⇨ Define infection and explain the clinical features of infection

Short answers

- ⇨ Define infection
- ⇨ Write the difference between infection and inflammation

MCQs

1. **Mycobacterium leprae leads to the manifestation of**

   a. Tuberculosis;
   b. Hansen's disease;
   c. Cholera;
   d. Plague

   Answer -(b)

2. **Tetanus is caused by**

   a. Yersinia pestis;
   b. Vibrio cholerae;
   c. Clostridium tetani;
   d. Neisseria gonorrhoeae

   Answer -(c)

3. **Microorganism responsible for the occurrence of typhoid infection gains the entry via**

   a. Inoculation;
   b. Inhalation;
   c. Oral route;
   d. None of the above

   Answer -(c)

4. **Cross infections occurring hospital is termed as**

   a. Iatrogenic infection;
   b. Focal infection;
   c. Nosocomial infection;
   d. Exogenous infection

   Answer -(c)

5. **Find the one which does not belong to one group**

   a. Cholera;
   b. AIDS;
   c. Influenza;
   d. COVID-19

   Answer -(a)

***

Introduction and Classification of Micro Organisms

9

Learning objectives

- ⇨ To know the brief description about microorganisms
- ⇨ To know the brief idea about bacteria, virus and fungi

⇨ Microorganisms or microbes are those living organisms which are not visible to unaided eye. They are visible in the microscopic examination. The study of microbes which infect the human beings, the diseases caused by these invisible creatures, their diagnosis and treatment is dealt in the separate science called medical microbiology. It also deals with the response of the human hosts to microbial or other antigens.

⇨ Microorganisms are a heterogenous group of several distinct class of living beings. They are categorised under the kingdom Protista. Based on the differences in the cellular organisation and biochemistry, the kingdom Protista has been divided into

- ❑ **Prokaryotes**– do not possess a well developed nucleus and other cellular organelle. E.g. bactiera, blue green algae
- ❑ **Eukaryotes**– possess a well developed nucleus and other cell organelle. E.g. protozoa, fungi, slime moulds

⇨ As far as the diseases observed in the human beings are concerned, three types of microorganisms are of high clinical significance.

- ❑ Bacteria
- ❑ Virus
- ❑ Fungus

Bacteria

⇨ Bacteria are prokaryotic microorganisms that do not contain chlorophyll. They are unicellular and do not show true branching.

⇨ **Size of bacteria:** The limit of resolution of unaided eye is about 200 microns. Bacteria are much smaller, can be visualised under magnification. Bacteria of medical importance are having the diameter of 0.2–1.5 microns and about 3–5 microns in length.

⇨ **Shape of bacteria:**

- ❑ Depending upon the shape, bacteria are classified into several varieties.
- ❑ Cocci (from kokkos meaning berry) are spherical or oval cells

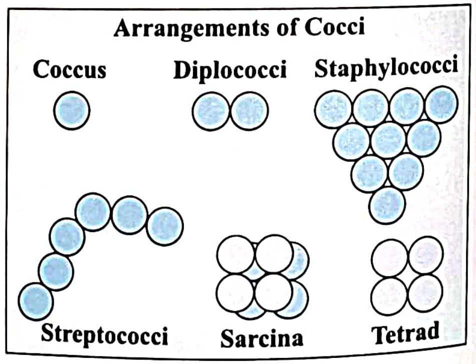

Arrangements of Cocci
Coccus
Diplococci
Staphylococci
Streptococci
Sarcina
Tetrad

Fig 9.1: Arrangements of Cocci

- ❑ Bacilli (from bacillus meaning rod) are rod shaped cells
- ❑ **Vibrios** are comma shaped, curved rods and derive their names from characteristic vibratory motility.

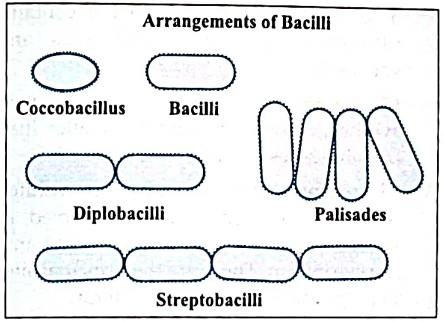

Arrangements of Bacilli
Coccobacillus
Bacilli
Diplobacilli
Palisades
Streptobacilli

Fig 9.2: Spirillae - rigid spiral forms

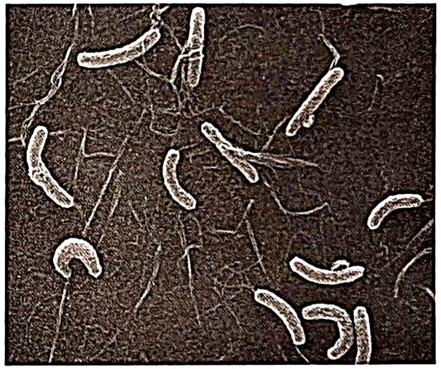


Fig 9.3: Spirochetes

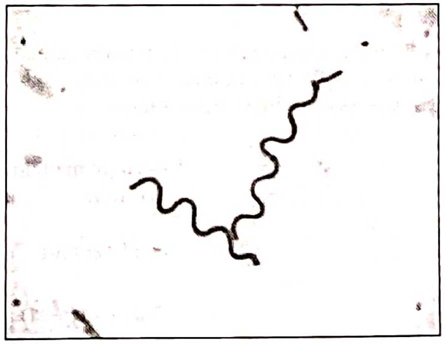


Fig 9.4: Spirochetes

- ❑ **Spirochetes** – (from speira meaning coil and chaite meaning hairs) are flexuous spiral forms
- ❑ **Actinomycetes** – are branching filamentous bacteria, because of fancied resemblance to the radiating rays of sun when seen in tissue lesions

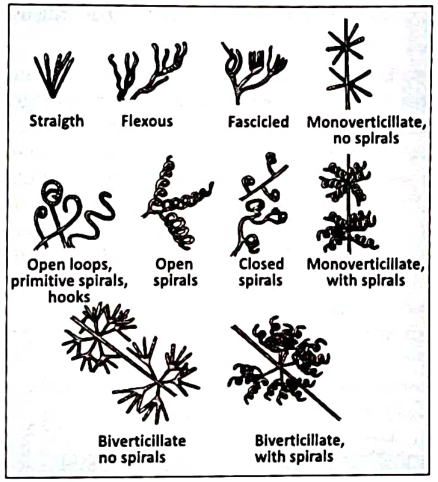

Straigth
Flexous
Fascicled
Monoverticillate, no spirals
Open loops, primitive spirals, hooks
Open spirals
Closed spirals
Monoverticillate, with spirals
Biverticillate no spirals
Biverticillate, with spirals

Fig 9.5: Actinomycetes

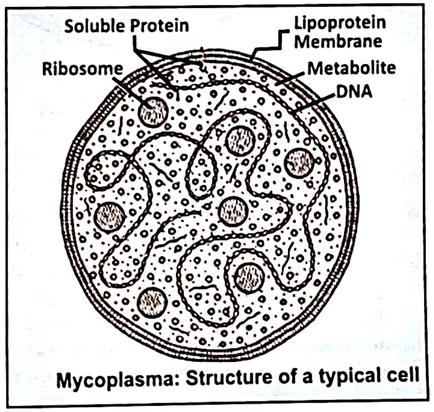

Soluble Protein
Lipoprotein Membrane
Ribosome
Metabolite
DNA
Mycoplasma: Structure of a typical cell

Fig 9.6: Mycoplasma

- ❑ **Mycoplasmas** – bacteria which are cell wall deficient and do not possess a stable morphology. They occur as round or oval bodies and as interlacing filaments.

- Bacteria sometimes show characteristic cellular arrangement or grouping.
    - ☐ Thus, cocci may be arranged in pairs (diplococci) or in chains (streptococci) or group of four (tetrads) or eights (sarcina) or as grape like clusters (staphylococci).
    - ☐ Some bacilli may be arranged in chains (streptobacilli). Others may be arranged at angles to each other, presenting a cuneiform or Chinese letter pattern (corynebacteria). The type of cellular arrangement is determined by the plane through which binary fission takes place and by the tendency of the daughter cells to remain attached even after division.

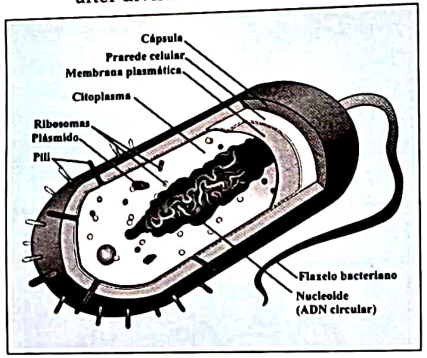


Fig 9.7: Structure of bacterial cell

- **Cell wall:** outermost layer, gives rigidity to the cell. This cannot be seen in direct light microscopy. 10-25 nm thick and account for 20-30% of the dry weight of the cells. It is chemically composed of mucopeptide scaffolding formed by N acetyl glucosamine and N acetyl muramic acid molecules.
- **Cytoplasmic membrane:** 5-10 nm thick lining the inner surface of the cell wall and separating it from cytoplasm. It acts as semipermeable membrane controlling inflow and outflow of metabolites to and from the cytoplasm.
- **Cytoplasm:** it is a colloidal system of a variety of organic and inorganic solutes in a viscous watery solution. It contains ribosomes, mesosomes, inclusions and vacuoles.
- **Ribosomes:** are centres of protein synthesis. These are slightly smaller than the ribosomes of eukaryotic cells.
- **Mesosomes:** are vesicular, convoluted or multilaminated structures formed as invaginations of plasma membrane into the cytoplasm. These are the principal sites of respiratory enzymes in bacteria.
- **Nucleus:** these appear as oval or elongated bodies, generally one per cell.
- **Slimy layer and capsule:** this occurs around the cell wall due to secretion of viscid material.
- **Flagella:** this is the structure related to motivation or movement. These are 3-20 μ long and terminate in a square tip. These are made up of a protein called flagellin similar to keratin or myosin.
- **Fimbriae:** these are fine hair like appendages 0.5μ long and less than 10 nm thick and project from cell surface. These will function as organs of adhesion helping the cells to adhere firmly to particles of various kinds.

Virus

- Viruses do not fall strictly into the category of unicellular organisms as they do not possess a cellular organisation.

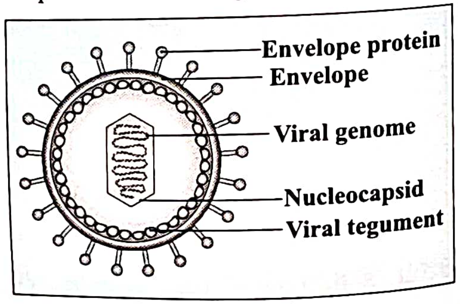


Fig 9.8: Structure of virus

- Even the simplest microorganisms contain cell wall, containing both DNA and RNA, synthesising their own macromolecular constituents and multiplying by binary fission. On the other hand, viruses do not have a cellular organisation and contain only one type of nucleic acid either DNA or RNA, but never both. They are obligate intracellular parasites. They lack the enzymes necessary for protein and nucleic acid synthesis and dependent on host cells for their replication or proliferation. They multiply by complex process and not by binary fission.
- They are unaffected by antibacterial antibiotics.
- The medical importance lies in their ability to cause a very large number of human diseases. The diseases may range from minor ailments such as common cold to serious terrifying diseases such as rabies and AIDS. The viral disease may be sporadic such as mumps or endemic like infectious hepatitis, epidemic like dengue or pandemic like influenza.
- These diseases may be either localised to circumscribed areas (arboviruses) or worldwide areas (herpes simplex virus).
- The control of bacterial infections has increased the role of viral infections in human race.
- **Pathogenesis of viral infection:**
    - ☐ Depending upon the clinical outcome, viral infections can be classified as inapparent (subclinical) and apparent (clinical) infections. The apparent infections may be acute, subacute or chronic. Some infections are characterised by latency. Recurrent herpes simplex and herpes zoster are examples of latent infections.
    - ☐ Viruses can enter the body through respiratory and alimentary tracts, skin, conjunctiva and genital tract. Some viruses can be transmitted vertically too i.e. from parent to progeny.
    - ☐ After entry of virus in the body, virus will proliferate in sites of election and causes lesions in target tissues. The incubation period is usually shorter when the site of entry of virus and target organ of affliction are same. For example, respiratory viral infections. The incubation period is usually longer when the site of entry of virus and target organ of affliction are different such as chickenpox or poliomyelitis.

Fungi

- Fungi are eukaryotic Protista that differ from bacteria and other prokaryotes in many ways. They possess rigid cell walls containing chitin, mannan and other polysaccharides. The cytoplasmic membrane contains sterols. They possess true nuclei with nuclear membrane and paired chromosomes. They divide asexually, sexually or by both processes.
- They may be unicellular or multicellular. The simplest form of fungus is unicellular budding yeast.
- Elongation of the cell produces a tubular, thread like structure called hypha. A tangled mass of hyphae constitutes mycelium. Fungi which form mycelia are called moulds or filamentous fungi. Hyphae may be septate or nonseptate. The septa when present, have holes through which free flow of cytoplasmic material can take place.
- In a growing colony of filamentous fungus, the mycelium can be divided into the vegetative mycelium which grows into medium and the aerial mycelium which projects from the surface.
- Depending upon cell morphology, fungi can be divided into four classes: yeasts, yeast like fungi, moulds and dimorphic fungi.

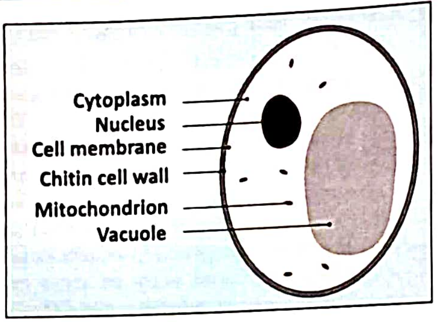

Cytoplasm
Nucleus
Cell membrane
Chitin cell wall
Mitochondrion
Vacuole

Fig 9.9: Fungi

- ☐ **Yeasts** – unicellular fungus which occur as spherical or ellipsoidal cells and reproduced by simple budding. The only pathogenic yeast is Cryptococcus neoformans.
- ☐ **Yeast like fungi** – grow partly as yeast and partly as elongated cells resembling hyphae. The example for this type of fungus is Candida albicans.

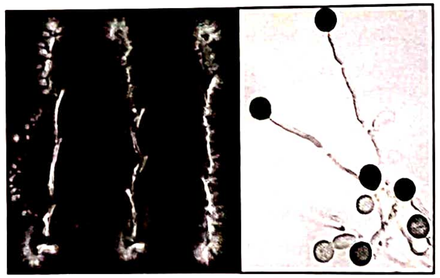


Fig 9.10: Yeast like fungi

- ☐ **Moulds or filamentous fungus** form true mycelia and reproduce by formation of different types of spores. The example of pathological moulds is dermatophytes.
- ☐ **Dimorphic fungi** – can occur as filaments or as yeasts depending upon the conditions of growth. In host tisssues or cultures at 37° C they occur as yeasts while in the soils and in cultures at 22° C they appear as moulds. Most fungi causing systemic infections are dimorphic fungi.

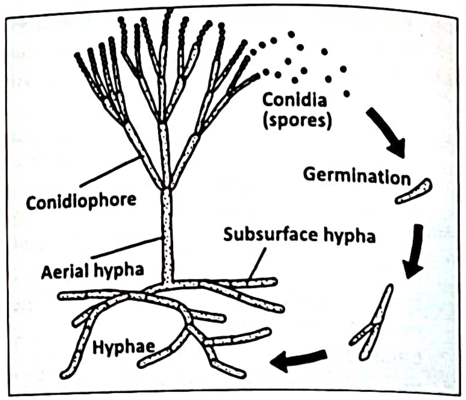

Conidia
(spores)
Germination
Conidiophore
Subsurface hypha
Aerial hypha
Hyphae

Fig 9.11: Dimorphic fungi

⇨ The laboratory diagnosis of fungal infections is made by microscopic examination of materials from the lesions and by morphologic studies of fungus isolates. Tissue specimens such as skin scrapings are generally examined as wet mounts after treatment with 10% potassium hydroxide. The alkali digests the cells and other tissue materials enabling the fungus elements to be seen clearly. Small bits of fungus colonies may be teased onto a slide and mounted in lactophenol cotton blue for microscopic study.

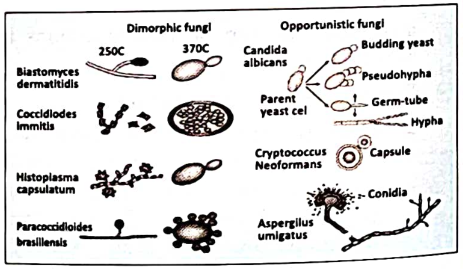

Dimorphic fungi
250C
370C
Biastomyces dermatitidis
Coccidiodes immitis
Histoplasma capsulatum
Paracoccidioides brasiliensis
Opportunistic fungi
Candida albicans
Parent yeast cel
Budding yeast
Pseudohypha
Germ-tube
Hypha
Cryptococcus Neoformans
Capsule
Aspergilus umigatus
Conidia

Fig 9.12: Structures of differnt forms of fungi

⇨ The commonest culture media used in mycology are Sabouraud's glucose agar, Czapek Dox medium and Cornmeal agar. The addition of antibiotics prevents bacterial contamination.

⇨ Identification of fungus is based on the morphology of fungus and of its colony. Growth characteristics useful for identification are rapidity of growth, colour and morphology of the colony on the obverse and pigmentation on the reverse. Hyphal diameter, presence or absence of septa are of clinical significance.

Chapter Resources

1. Textbook of Microbiology by Ananthanarayan and Panicker, 7th Edition, Orient Longman Publication, Hyderabad, 2005

Key points of the chapter

⇨ Microorganisms (microbes) are those living organisms which are not visible to unaided eye. They are visible on microscopic examination.

⇨ The study of microbes which infect human beings, the diseases caused by these invisible creatures, their diagnosis and treatment is dealt in medical microbiology.

⇨ Microorganisms are a heterogenous group of several distinct class of living beings. They are categorized under kingdom Protista. Based on the differences in the cellular organization and biochemistry, kingdom Protista has been divided into prokaryocytes (do not possess a well-developed nucleus and other cell organelles) and eukaryocytes (possess a well-developed nucleus and other cell organelles)

⇨ As far as diseases observed in the human beings are concerned, three types of microorganisms are of high clinical significance. They are bacteria, virus and fungus.

Probable questions may be asked in the examination

Short essays

⇨ Define bacteria and explain the characters of bacteria

⇨ Define virus and explain the characters of virus

⇨ Draw a neat and labelled diagram of bacteria and explain the parts

⇨ Draw a neat and labelled diagram of virus and explain the parts

⇨ Draw a neat and labelled diagram of fungi and explain the significance of fungi in clinical medicine

Short answers

⇨ Write a short note on bacteria

⇨ Write a short note on virus

⇨ Write a short note on fungi

MCQs

1. **Spherical or oval shaped bacteria is termed as**
   a. Bacilli;
   b. Cocci;
   c. Spirillae;
   d. Actinomycetes

   Answer -(b)
2. **Bacilli arranged in chain form is termed as**
   a. Streptobacilli;
   b. Diplobacilli;
   c. Pallisades;
   d. Coccobacillus

   Answer -(a)
3. Which of the following is not a viral

disease?

a. Rabies;

b. Poliomyelitis;

c. Rhuematic fever;

d. Mumps

Answer -(c)

4. **Find the one which does not belong to one group**

a. Influenza;

b. Tuberculosis;

c. Leprosy;

d. Cholera

Answer -(a)

5. **The thickness of cell wall of bacteria is about**

a. 30 – 60 nm;

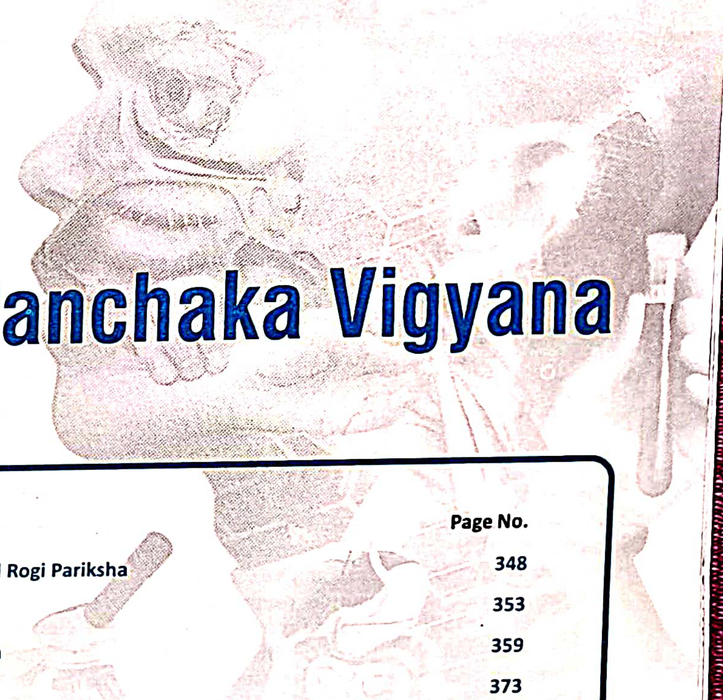
b. 10-25 nm;

c. 1-2 nm;

d. 50-100 nm

Answer -(b)

***



SECTION - IV

Nidana Panchaka Vigyana

With G.K.'s Opinion

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Roga Pariksha and Rogi Pariksha

1

Learning objectives

- ⇨ Meaning of Pariksha with clinical example
- ⇨ Actual meaning of Roga Pariksha and Rogi Pariksha
- ⇨ The factors included in Roga Pariksha
- ⇨ The various types of Rogi Pariksha
- ⇨ The difference between Roga Pariksha and Rogi Pariksha

The term Pariksha is definition as

प्रमाणैरर्थावधारणं परीक्षा।।

Pariksha is the method which helps an individual to come to a conclusion by variety of proofs. For example, when the individual is presented with itching and skin lesions, we can come to a conclusion that the person is having the affliction of *Tvak*. In this occasion, one has to do the detailed analysis of *Tvak*. Let us take another example of presenting complaint of inability to do finer movements of hands makes one to think of the involvement of *Vyanavata* and *Asthivaha Srotas*. This in turn implies that the clinician should concentrate on the assessment of *Vyanavata* and *Asthivaha Srotas*.

As far as the use of term '*Pariksha*' is concerned, it is used in two different contexts – *Roga Pariksha* and *Rogi Pariksha*. The term *Roga Pariksha* refers to the methods of examinations of the disease. The term *Rogi Pariksha* refers to the examination of the diseased individual.

Roga Pariksha

रोगं निदानप्राग्रूपलक्षणोपशयाप्तिभिः॥22॥

A.Hr.Su. – 1/22

Roga Pariksha is also known as *Pancha Lakshana Nidana*. That means five folds of examination of the disease. They are

1. *Nidana* – aetiological factors
2. *Purvarupa* – prodromal symptoms
3. *Rupa* – main clinical features or cardinal features
4. *Upashaya* – therapeutic tests to confirm or reject the diagnosis of the disease
5. *Samprapti* – pathogenesis

Rogi pariksha

The term *Rogi Pariksha* literally means examination of diseased individual. Depending upon the different criteria, *Rogi Pariksha* is classified into several categories – two types, three types, four types, six types, eight types, ten types and twelve types of the examination.

Types of Pariksha

⇨ 2 types

द्विविधा तु खलु परीक्षाज्ञानवतां-प्रत्यक्षम्, अनुमानं च।

Ca.Vi. – 8/83

- ☐ *Pratyaksha* (Perceptual method)
- ☐ *Anumana* (Inferential method)

⇨ 3 types

दर्शनस्पर्शनप्रश्नैः परीक्षेत च रोगिणम्॥ A.Hr.Su. – 1/22

- ☐ *Darshana* (Examination of the patient through eyes of the clinician)
- ☐ *Sparshana* (Examination of the patient through hands of the clinician)
- ☐ *Prashna* (Evaluation of the patient through thorough interrogation)

⇨ 3 types

एवमेपाद्विविधा परीक्षा, त्रिविधा वा सहोपदेशेन॥83॥

Ca.Vi. – 8/83

- ☐ *Pratyaksha* (Examination of the patient by special senses of the clinician)
- ☐ *Anumana* (Evaluation of the patient through inferences made by the clinician)
- ☐ *Aptopadesha* (Evaluation of the patient through authoritative informations such as literature references)

⇨ 4 types

तस्य चतुर्विध परीक्षा - आप्तोपदेशः, प्रत्यक्षमनुमानं युक्तिश्चेति॥ च.सू. 11/17

- ☐ *Pratyaksha* (Evaluation of the patient by the special senses of the clinician)
- ☐ *Anumana* (Evaluation of the patient by the inferences made by the clinician)
- ☐ *Aptopadesha* (Evaluation of the patient through authoritative information such as textbooks, preceptor etc)
- ☐ *Yukti* (Evaluation of the patient through experimental evidence)

⇨ 6 types

षड्विधो हि रोगाणां विज्ञानोपायः।
तद्यथा पञ्चभिः श्रोत्रादिभिः प्रश्नेन चेति॥ सु.सू. 10/4

- ☐ *Sparshanendriya Pariksha* (Examination by the sense of touch of the clinician)
- ☐ *Chakshurindriya Pariksha* (Examination by the sense of vision of the clinician)
- ☐ *Shrotrendriya Pariksha* (Examination by the sense of hearing of the clinician)
- ☐ *Ghranendriya Pariksha* (Examination by the sense of smell of the clinician)
- ☐ *Rasanendriya Pariksha* (This is done with the help of inference)
- ☐ *Prashna Pariksha* (Interrogation method or history taking)

⇨ 8 types

रोगाक्रान्त शरीरस्य स्थानान्यष्टौ परीक्षयेत्।
नाडीं मूत्रं मलं जिह्वां शब्दं स्पर्शं दृगाकृतिः॥ Yo. Ra.

- ☐ *Nadi Pariksha* – assessment of the *Nadi*
- ☐ *Mutra Pariksha* – assessment of urine
- ☐ *Mala Pariksha* – assessment of faeces
- ☐ *Jihva Pariksha* – assessment of the tongue
- ☐ *Shabda Pariksha* – assessment of the voice of the patient
- ☐ *Sparsha Pariksha* – assessment of the skin of the patient
- ☐ *Drik Pariksha* – assessment of the eye of the patient
- ☐ *Akriti Pariksha* – assessment of the physique of the individual

⇨ 10 types

तस्मादातुरं परीक्षेत प्रकृतितश्च, विकृतितश्च, सारतश्च, संहननतश्च, प्रमाणतश्च, सात्म्यतश्च, सत्त्वतश्च, आहारशक्तितश्च, व्यायामशक्तितश्च, वयतश्चेति, बल प्रमाणविशेपग्रहणहेतोः॥ च.वि. 8/94

- ☐ *Prakrititah Pariksha* – assessment of *Prakriti* (constitution) of an individual
- ☐ *Vikritituh Pariksha* – assessment of morbidity of the pathological factors
- ☐ *Saratah Pariksha* – assessment of essence of the *Dhatu* in an individual
- ☐ *Samhananatah Pariksha* – assessment of compactness of body organs
- ☐ *Pramanatah Pariksha* – assessment of measurement of different body parts
- ☐ *Satvatah Pariksha* – assessment of mental faculties of an individual
- ☐ *Satmyatah Pariksha* – assessment of homologation of an indivdual
- ☐ *Ahara Shaktitah Pariksha* – assessment of one's capacity of ingestion and digestion
- ☐ *Vyayama Shaktitah Pariksha* – assessment of one's capacity to do the exercise
- ☐ *Vayatah Pariksha* – assessment of age

⇨ 12 types

सत्यायुषि व्याधि ऋत्वग्नि वयोदेहबल
सत्वसात्म्यप्रकृतिभेषजदेशान् परीक्षेत। सु.सू. - 35/3

☐ *Ayu* – assessment of life span of the individual

☐ *Vyadhi* – assessment of the stage and prognosis of the disease

☐ *Ritu* – assessment of the season

☐ *Agni* – assessment of digestive capacity of the individual

☐ *Vaya* – assessment of the age

☐ *Deha* – assessment of the body

☐ *Bala* – assessment of the physique of the individual

☐ *Satva* – assessment of the mental faculty of the person

☐ *Satmya* – assessment of the homologation of the person

☐ *Prakriti* – assessment of the constitution of the person

☐ *Bheshaja* – assessment of the medicine to be taken by the person

☐ *Desha* – assessment of the residing locality of the person

⇨ 12 types as per *Charaka*

दोषभेषजदेशकालबलशरीरसाराहार सात्म्यसत्व-
प्रकृतिवयसां मानमवहित मनसा यथावत् ज्ञेयं भवति
भिषजा ......॥ च.वि. 1/3

☐ *Dosha* – assessment of *Dosha*

☐ *Bheshaja* – assessment of the medications to be taken by the patient

☐ *Desha* – assessment of the residing the locality of the patient

☐ *Kala* – assessment of the season

☐ *Bala* – assessment of physical strength of the person

☐ *Sharira* – assessment of the body of the person

☐ *Sara* – assessment of the essence of *Dhatu* of the individual

☐ *Ahara* – assessment of the nature of food consumed by the patient

☐ *Satmya* – assessment of homologation of the individual

☐ *Satva* – assessment of mental faculties of the person

☐ *Prakriti* – assessment of the constitution of the person

☐ *Vaya* – assessment of the age of the patient

The detailed description of *Roga Pariksha* and *Rogi Pariksha* was illustrated in the coming chapters with suitable examples.

Utility of Pariksha

परीक्षायास्तु प्रयोजनं प्रतिपत्तिर्ज्ञानम्॥
प्रतिपत्तिर्नाम यो विकारो यथा प्रतिपत्तव्यस्तस्य तथा-
नुष्ठान ज्ञानम्॥ च.वि. 8/132

The proper method of *Pariksha* helps the clinician to gain *Pratipatti Jnana*. In *Ayurveda*, several aetiological factors for the manifestation of any disease. To identify the specific nature of disease, typical features of the disease are also described. The knowledge of determining the specific aetiological factors and typical clinical features, helps to one plan the appropriate treatment. For example, in case of *Ratrijagarana* (awakening at night time) and *Ruksha Bhojana* (consumption of excess *Ruksha* or dry substances) will lead to the increase of *Ruksha* (dry quality) in the body. But, simply substituting the qualities opposite to *Ruksha* i.e. *Snigdha* (unctuous) may not be sufficient. First of all, we have to identify the exact cause of the increase of *Ruksha* quality in the body. In case of *Ratrijagarana* (awakening at night time), one should advise sleeping in day time prior to the consumption of breakfast and in case of *Ruksha Bhojana Janya Ruksha Vriddhi*, we have to supplement *Snigdha* (unctuous) substances to the patient. Similarly, we have to consider the *Kapha* vitiation due to *Divasvapna* (sleeping after the consumption of lunch) and *Snigdha Bhojana* (consumption of unctuous substances).

ज्ञानपूर्वकं हि कर्मणां समारम्भं प्रशंसन्ति कुशला:॥ च.वि. - 8

A physician must have knowledge, good skill about examination of the patient and analysing the disease for proper diagnosis. Then only, the clinician can cure the disease completely. For example, when the 35 years old male patient presents with *Daha* in *Ura Pradesha* (burning sensation in the epigastrium) associated with (*Amla Udgara*) sour belching indicates the dominance of *Pitta Dosha* at that particular moment with involvement of *Annavaha* and *Pranavaha Srotas* where *Pratiloma Pravritti* of *Vata* both *Samana* and *Prana Vata* are occurring. That is the reason, in treating such a condition, we have to concentrate on pacifying vitiated *Pitta Dosha* along with restoration of the function of *Annavaha* and *Pranavaha Srotas*. Further we have to avoid substances which increase the *Pitta Dosha* in the body i.e. substances which has *Snigdhata* (unctuousness), *Laghu* (lightness), *Tikshna* (sharp), *Ushna* (hot potency), *Drava* (liquidity). The substances containing *Masha* (black gram), *Matsya* (fish), *Sarshapa Taila Bhrishta Bhojana* (substances prepared from mustard oil) etc should be avoided. Thus, we have to read between the lines while giving appropriate treatment.

रोगमादौ परीक्षेत् ततोऽनन्तरमौषधम्॥ च.सू. 20/

The first and foremost step is to examine the patient and study the disease form in the patient, diagnose the disease and examine the appropriate medication to be given to the patient and then start the treatment on the basis of findings of *Pariksha*. In this verse, it is highlighted that along with the examination of the disease, examination of the medicine should also be done so that appropriate medicine can be given in right time, right dosage whether *Shodhana* or *Shamana* therapy to be given. This has to be elaborately analysed as this is not the purpose of this textbook we are not going to discuss in this section.

हेतौ लिङ्गे प्रशमने रोगाणामपुनर्भवे।
ज्ञानं चतुर्विधं यस्य स राजार्हो भिषक्तमः॥ च.सू. - 9/19

The physician is called as royal physician he who knows the knowledge of etiology, symptoms and appropriate treatment and preventive measures for the manifestation of the disease. In other words, we have to have the total knowledge in relation to a particular disease to manage and get the desired result.

Table 1.1: Difference between Roga Pariksha and Rogi Pariksha

Roga Pariksha	Rogi Pariksha
Means the examination of the disease	Means the examination of the diseased individual
With the help of this, we can able to make hypothetical diagnosis	With the help of this, we can able to make clinical diagnosis
Five types are mentioned	Two, three, four, six, eight, ten and twelve types are being mentioned

Chapter Resources

1. Excerpts of Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya

Key points of the chapter

⇨ प्रमाणैरर्थावधारणं परीक्षा॥ Pariksha is the method which helps an individual to come to a conclusion by variety of proofs.

⇨ Pariksha is used in two different contexts – Roga Pariksha (examination of the disease) and Rogi Pariksha (examination of the diseased individual)

⇨ Roga Pariksha is also called as Pancha Lakshana Nidana or Nidana Panchaka – Nidana, Purvarupa, Rupa, Upashaya and Samprapti.

⇨ Rogi Pariksha is classified into several categories – 2 types (Pratyaksha and Anumana); 3 types (Darshana, Sparshana and Prashna); 3 types (Aptopadesha, Pratyaksha and Anumana); 4 types (Aptopadesha, Pratyaksha, Anumana and Yukti); 6 types (Sparshanendriya Pariksha etc Panchendrya Pariksha and

Prashna Pariksha); 8 types (Nadi, Mutra, Mala, Jihva, Shabda, Sparsha, Drik and Akriti); 10 types (Prakriti, Vikriti, Sara, Samhanana, Pramana, Satmya, Satva, Aharashakti, Vyayamashakti, Vaya); 12 types (Dosha, Bheshaja, Desha, Kala, Bala, Sharira, Sara, Ahara, Satmya, Satva, Prakriti, Vaya)

- ⇨ Utility of Pariksha – proper identification of disease, proper management of the patient and accurate prediction of prognosis.

Probable questions may be asked in the examination

Long essays

- ⇨ Explain Roga Pariksha in detail
- ⇨ Explain Pancha Lakshana Nidana in detail
- ⇨ Enumerate different Rogi Pariksha as described in different Ayurveda literatures
- ⇨ Describe different types of Rogi Pariksha in detail. Discuss vividly Shadvidha Rogi Pariksha in detail. Discuss the importance of Rogi Pariksha.

Short essays

- ⇨ Roga Pariksha
- ⇨ Difference between Roga Pariksha and Rogi Pariksha

Short answers

- ⇨ Define Pariksha
- ⇨ Enumerate Roga Pariksha
- ⇨ Enumerate Pancha Lakshana Nidana
- ⇨ Explain the utility of Pariksha
- ⇨ Enumerate Ashta Sthana Pariksha/ Dashavidha Pariksha
- ⇨ Describe difference between Roga and Rogi Pariksha

MCQs

1. **Prashna is included in**
   a. Darshanadi Trividha Pariksha
   b. Shadvidha Pariksha;
   c. Both 1 and 2;
   d. None of the above

   Answer -(c)

2. **Akriti Pariksha is included in**
   a. Dashavidha Pariksha;
   b. Ashtasthana Pariksha;
   c. Shadvidha Pariksha;
   d. Chaturvidha Pariksha

   Answer -(b)

3. **Shadvidha Pariksha is the contribution of**
   a. Charaka;
   b. Sushruta;
   c. Yoga Ratnakara;
   d. Sharangadhara

   Answer -(b)

4. **Ashta Sthana Pariksha is the contribution of**
   a. Charaka;
   b. Sushruta;
   c. Yoga Ratnakara;✓
   d. Sharangadhara

   Answer -(c)

5. **Vaya Pariksha is included in**
   a. Dashavidha Pariksha;
   b. Dvadashavidha Pariksha;
   c. Both 1 and 2;
   d. None of the above

   Answer -(c)

***

2

Nidana Panchaka

Learning objectives

- ⇨ Meaning of Nidana in diagnosis and as a causative factor
- ⇨ Meaning of Roga Pariksha and Pancha Lakshana Nidana
- ⇨ Significance of Nidana Panchaka in diagnosis of the disease
- ⇨ The word Nidana is used to denote two different meanings, one as an etiological factor and other as a means of diagnosis. The word Panchaka refers to fivefolds. Altogether, Nidana Panchakas are the five fold methods of understanding the particulars of any disease. The term Nidana Panchaka is also known as Pancha Lakshana Nidana and Roga Pariksha. These are Nidana (aetiological factor), Purvarupa (prodromal symptoms), Rupa (clinical features), Upashaya (diagnostic approach to confirm or to differentiate diseases having similar clinical features) and Samprapti (pathogenesis).
- ⇨ The knowledge of these are important because if the physician plans the treatment without the proper analysis of Nidana Panchaka, the complete cure of the disease is questionable. Therefore, the experts of Ayurveda have explained five ways of diagnosis to have a proper knowledge of a disease. Though, Nidana etc are helpful in diagnosing a disease separately, it is essential to know all five aspects of Nidana because all these will indicate different time and circumstances of a disease.

Nidana

- ⇨ *Nidanas* are considered as the factors to know the cause of the manifested or unmanifested disease. For example, in the disease called *Pandu*, eating the mud is considered as the definite cause. The consumption of *Makshika* (fly) leads to the manifestation of *Chardi* (vomiting). *Atyashana* (more amount of consumption of food at a particular time) is responsible for the manifestation of *Ajirna* (indigestion), *Viruddhashana* (improper consumption of food) is responsible for the manifestation of *Kushtha* (group of skin diseases), *Vishamashana* (food consumption at improper time) is the cause of *Rajayakshma* (group of diseases where multiple *Srotases* will be involved). Thus identification of the *Nidana* will be able to diagnose the disease conditions.
- ⇨ The assessment of *Nidana* will be helpful in assessing the prognosis of a disease. i.e. if the causative factor is mild, the the disease is curable and if the causative factor is much virulent and is in contact with the body for longer duration, then the disease is considered as incurable or requires longer time for restoration of health. For example, if the person who has the habit of consumption of bread etc bakery items for the past six months and has the habit of consumption of sour curds or butter milk for the past three months, he may develop the more virulent *Pitta Pradhana Vikara* in future. In another individual who has the habit of consumption of bread for the period of two months and consumes sour butter milk for a week, may have the mild *Pitta* dominance when compared to former individual. The nature of *Pitta*

Pradhana Vikara will be determined by the *Kha Vaigunya* in the body, duration of consumption of causative factor, consumption of amount of causative factor, *Prakriti* of the individual etc.

⇨ As per literature, one causative factor is responsible for manifestation of multiple diseases. One cause is leading to the manifestation of only one disease. multiple causes are responsible for the production of one disease in the body. multiple causes are causing multiple diseases in the body. For example, consumption of *Ruksha guna* substances is responsible for the manifestation of *Vatavyadhi, Jvara, Vatarakta* etc. *Ruksha* substances consumption can lead to *Vatavyadhi* only. *Ruksha, Laghu, Sita* substances can lead to *Vatavyadhi* only and *Ruksha, Laghu* and *Sita* substances can lead to the manifestation of *Vatavyadhi, Jvara, Vatarakta* etc.

एको हेतुरनेकस्य तथैकस्यैक एव हि।
व्याधेरेकस्य चानेको बहूनां वहवोऽपि च॥24॥
ज्वरभ्रमप्रलापाद्या दृश्यन्ते रूक्षहेतुजाः।
रूक्षैणैकेन चाप्येको ज्वरो रूक्षादिभिर्भवेत्॥25॥
हेतुभिर्बहुभिश्चैको ज्वरो रूक्षादिभिर्भवेत्।
रूक्षादिभिर्ज्वराद्याश्च व्याधयः संभवन्ति हि॥26॥

Ca.Ni. – 8/24-26

⇨ In the classics, it is being told that the avoidance of the causative factor is the prime and first line of management in treating any type of the disease. For example, if the person is suffering from *Amlapitta*, the avoidance of the food substances having the sour, salt and pungent taste along with *Pitta Shamaka* medicines likely to show speedy recovery than the people who are negligent on the diet and regimen.

सङ्क्षेपतः क्रियायोगो निदानपरिवर्जनम्॥ Su.Ut. – 1/25

⇨ All the *Nidana* can be broadly classified into two – *Sannikrishta* and *Viprakrishta*. *Sannikrishta Nidana* are those which do not have *Chayavastha* during the manifestation of the disease and *Viprakrishta Nidana* are those which will have *Chayavastha* during the manifestation of the disease. The person is exposed to both *Sannikrishta* and *Viprakrishta Nidana* at a particular time. If *Sannikrishta Nidana* is more potent, then *Sannikrishta Nidana* are responsible for the manifestation of the disease and *Viprakrishta Nidana* is more virulent, then it is responsible for the manifestation of the disease. The manifestation of the disease also depends upon the strength of the patient, status of the nutrition etc.

काठिन्यादूनभावाद्वादोषोऽन्तः कुपितोमहान्॥329॥

Ca.Ci. – 30/329

काठिन्यादिति दोषचयरूपसंहतत्वात्। ऊनभावात् अचयप्रकोपात्; अचयेऽपि च दोषाणां प्रकोपो भवत्येव; यथा-बलवद्विग्रहादिभिर्वायोः, पित्तस्य क्रोधादिभिः, श्लेमणश्च दिवास्वप्नादिभिः; अयं चाचयप्रकोपो घनावयवोपचयाकर्तृत्वात् 'ऊनभावात् प्रकोप' इत्युच्यते॥ Ca.Ci. – 30/329, Cakra

Purvarupa

⇨ It is not possible to diagnose a disease simply by assessing the *Nidana*, the knowledge of *Purvarupa* will also help. For example, in the diseases, *Jwara* and *Gulma* are stated to be similar. In such cases, the knowledge of the *Purvarupa* will contribute in the diagnosis of a disease because the nature of pathogenesis is different in these two disease conditions.

⇨ If a patient is suffering from a pre monitory symptoms of a disease, then as per the pre monitory symptoms, specific line of treatment is separately mentioned. For example, if a patient is suffering from *Purvarupa* of *Jwara*, the *Laghvashana* (consumption of substances which are light to digest) and *Apatarpana* (measures which lead to the depletion of the body tissues) line of management is preferred as per *Charaka*. *Susruta* has mentioned *Ghritapana* as a line of treatment in *Purvarupa* of *Vataja Jwara*. In *Vishishta Purvarupa* of *Pittaja Jvara*, *Virechana* is planned and in *Vishishta Purvarupa* of *Kaphaja Jvara*, *Vamana* is planned.

तत्र पूर्वरूपदर्शने ज्वरादौ वा हितं लघ्वशनमपतर्पणं वा,
ज्वरस्यामाशयसमुत्थत्वात् ; ततः Ca.Ni. – 1/36

ज्वरस्य पूर्वरूपेषु वर्तमानेषु बुद्धिमान्।
पाययेत घृतं स्वच्छं ततः स लभते सुखम्॥97॥
विधिर्मारुतजेष्वेष पैत्तिकेषु विरेचनम्॥
मृदु, प्रच्छर्दनं तद्वत्कफजेषु विधीयते॥98॥

Su.Ut. – 39/97-98

⇨ The knowledge of curability and incurability of the disease is also depends on the knowledge of *Purvarupa*. For example, if the person is developing all the premonitory symptoms of *Jvara* mentioned in the classics, the the disease is considered as *Asadhya*.

पूर्वरूपाणि सर्वाणि ज्वरोक्तान्यतिमात्रया।
यं विशन्ति विशत्येनं मृत्युर्ज्वरपुरःसरः॥4॥ Ca.I. – 5/4

⇨ *Purvarupa* is also helpful in making the differential diagnosis. If the physician gets the doubt between *Prameha* and *Raktapitta*, the physician should enquire regarding the presence or absence of any premonitory symptoms. If the person says the absence of the premonitory symptoms of *Prameha* and presence of premonitory symptoms of *Raktapitta* along with presenting complaints of yellowish or reddish urine, then the diagnosis of *Raktapitta* is made. If the individual presents with premonitory symptoms of *Prameha* along with reddish or yellowish urine, then the diagnosis of *Prameha* is made.

हरिद्रावर्णं रुधिरं च मूत्रं विना प्रमेहस्य हि पूर्वरूपैः।
यो मूत्रयेत्तं न वदेत् प्रमेहं रक्तस्य पित्तस्य हि स प्रकोपः॥54॥ Ca.Ci. – 6/54

Rupa

⇨ Simply by the knowledge of the *Nidana* and *Purvarupa*, if one is not having any knowledge of the *Rupa*, then the complete knowledge of the disease cannot be obtained and if you don't know the disease properly, the successful management of the disease is not possible. Most of the patients come to the clinicians in *Rupa* stage only. Therefore, one should be thorough enough to diagnose the disease based on *Rupa* stage itself. The diagnosis of the disease is based on the presence or absence of *Rupa*. The presence of *Udara Utsedha* should be present to confirm the diagnosis of *Udara*. Discolouration and disfiguration of skin should be present to make the diagnosis of *Kushtha*. Fast spreading nature of the disease in the skin should be present to diagnose *Visarpa*.

⇨ By the knowledge of *Rupa*, *Sadhyasadhyata* (prognosis) of the disease can be predicted. In case of diagnosis of *Sanyasa*, one has to treat the condition as emergency. By default, the diagnosis of *Prameha* (increased frequency and passage of turbid urine) is considered to be *Yapya* (controllable) in nature.

हेतवः पूर्वरूपाणि रूपाण्यल्पानि यस्य च। Ca.Su. – 10/11
निमित्तपूर्वरूपाणां रूपाणां मध्यमे बले॥ Ca.Su. – 10/14

Upashaya

⇨ Suppose, if the symptoms of a disease are resembling as that of another disease or if the symptoms of a disease are not manifested clearly, then to have a clear-cut picture of the disease, the knowledge of *Upashaya* is essential. If the physician is not having knowledge of *Upashaya*, then it is difficult to clearly differentiate between the two diseases having similar symptoms and it is not possible to diagnose the disease. Therefore, the knowledge of *Upashaya* is highly important to diagnose the diseases having latent clinical features.

For example, if the physician gets the doubt between *Vatavyadhi* and *Urustambha*, the oil should be used for external application over the painful part. If there is aggrevation of the pain, the diagnosis of *Urustambha* is made and if there is subsidence of the pain then *Vatavyadhi* is being diagnosed.

गूढलिङ्गं व्याधिमुपशयानुपशयाभ्यां। Ca.Vi. 4/8

Samprapti

⇨ The major utility of *Samprapti* is to treat the patient efficiently and accurately, so that the recurrence of the disease becomes remote. Five types of *Samprapti* are being explained in the literatures – *Sankhya, Vikalpa, Vidhi, Pradhanya* and *Balakala Samprapti*. For the significance of *Nidana Panchaka*, the significance of individual type of *Samprapti* was highlighted here. Detailed description of the same will be dealt in the context of *Samprapti*. Therefore, *Amshamsha Kalpana* of the *Dosha*, virulence of *Dosha*, diurnal variation of the symptom, dominance of the *Dosha* etc will be helpful in the diagnosis of the disease. Because if one does not judge the disease as per *Samprapti*, the one cannot understand the qualitative and quantitative increase of any *Dosha* and strength of the causative factors, premonitory symptoms and clinical features of the disease which poses the difficulty in proper management.

⇨ The following informations are implying the importance of each of the subtype of *Samprapti*. As per different opinions, five types of *Samprapti* were being explained in different textbooks of *Ayurveda*. These are *Sankhya Samprapti, Vidhi Samprapti, Vikalpa Samprapti, Pradhanya Samprapti, Bala Samprapti* and *Kala Samprapti*.

⇨ With the help of *Vidhi Samprapti*, one can plan the management properly. Take the example of *Jvara*. Based on the *Dosha* involvement, *Jvara* is of 8 types. In this type, treatment should be planned based on *Dosha* dominance. *Jvara* is of 2 types *Antarvega* and *Bahirvega* based on *Lakshana*. *Antarvega Jvara* is difficult to cure and takes long time to pacify the illness. *Bahirvega Jvara* is easy to cure when compared to *Antarvega Jvara* as the *Lakshana* clearly confirm the diagnosis and takes short time to pacify the illness.

विधिर्नाम-द्विविधा व्याधयो निजागन्तुभेदेन, त्रिविधा-
स्त्रिदोषभेदेन,चतुर्विधाः साध्यासाध्यमृदुदारुणभेदेन॥4॥
Ca.Ni. – 1/12-4

⇨ With the help of *Pradhanya Samprapti*, one can assess the dominance of the *Dosha*. By this assessment, if one plans the treatment to pacify the dominant *Dosha* faster recovery can be attained. First of all, one has to list out all the *Lakshana* the patient is suffering from and analyse the *Dosha* responsible for each *Lakshana*. Then categorise the *Lakshana* into categories – *Vataja, Pittaja* and *Kaphaja*; *Rajasa* and *Tamasa Lakshana*. Which *Dosha* is producing the maximum *Lakshana* or most severe *Lakshana*, that *Dosha* is considered to be *Pradhana Dosha* in the manifestation of the illness.

प्राधान्यं पुनर्दोषाणां तरतमाभ्यामुपलभ्यते।
तत्र द्वयोस्तरः, त्रिषु तम इति॥3॥ Ca.Ni. – 1/12-3

⇨ With the help of *Vikalpa Samprapti*, one can assess the quantitative increase of different quality of the *Dosha* in the body. For example, if the person consumes *Hingu* increases the *Pitta Dosha* in the body by virtue of its *Katu, Ushna* and *Tikshna*. Consumption of *Tila* (sesamum seeds and products) increases the *Pitta Dosha* in the body due to its *Ushnatva*. Thus, the knowledge of *Vikalpa Samprapti* helps the clinician to plan the treatment depending upon the severity of the vitiation of *Pitta Dosha*.

समवेतानां पुनर्दोषाणामंशांशबलविकल्पो विकल्पो-
ऽस्मिन्नर्थे॥5॥ Ca.Ni. – 1/12-5

⇨ With the help of *Kala Samprapti*, dominance of the *Dosha* can be decided based on the time factor such as age, day, night, time of food and season. For example, in childhood, *Kapha* dominant diseases are usually observed in routine clinical practice. In midnoon, one can observe the dominance of the *Pitta Dosha* in the body by nature. There will be dominance of the *Vata Dosha* is observed after the complete digestion of the food.

नक्तंदिनर्तुभुक्तांशैर्व्याधिकालो यथामलम्॥ A.Hr.Ni.–1/11

⇨ By the help of *Bala Samprapti*, the prognosis of the disease is predicted depending upon the severity of the disease, quality and quantity of consumption of causative factor, number of *Dosha* and *Dushya* involved in the disease process, number of *Rogamarga* is affected, distribution of the symptoms in the body etc. For example, if the *Hetu, Purvarupa* and *Rupa* are favouring the manifestation of the disease, then the disease is considered to be more severe in nature and if the same are not favouring the manifestation of the disease, then such diseases are of mild to moderately severe in nature.

हेत्वादिकात्स्न्र्यावयवैर्बलाबलविशेषणम्॥ A.Hr.Ni.–1/11

Chapter Resources

☐ Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya excerpts

Key points of the chapter

⇨ **Nidana** is used to denote two different meanings – one, as etiological factor and other as a means of diagnosis. Panchaka is used to denote the number 5. Nidana Panchaka is also being termed as Roga Pariksha and Pancha Lakshana Nidana. These are Nidana (etiological factor), Purvarupa (prodromal symptoms), Rupa (clinical features), Upashaya (diagnostic approach to confirm or differentiate diseases having similar clinical features) and Samprapti (pathogenesis). The knowledge of these altogether will help the clinician to plan the treatment accordingly and appropriately.

⇨ **Importance of Nidana:**

☐ सङ्क्षेपतः क्रियायोगो निदानपरिवर्जनम्।। Su.Ut. – 1/25 If we come to know about the exact detail of Nidana responsible for disease manifestation, we can avoid the Nidana so that we can get speedy recovery from the illness.

☐ एको हेतुरनेकस्य तथैकस्यैक एव हि। व्याधेरेकस्य चानेको बहूनां वहवोऽपि च।। Ca.Ni. – 8/24 One Nidana becomes the cause for many diseases, one Nidana may become the cause for one disease, many Nidanas can become the cause for one disease and many Nidanas can become the cause for many diseases.

⇨ **Importance of Purvarupa:** Knowledge of Purvarupa will help in planning the line of treatment, predicting the prognosis of the disease and differentiating the diseases having similar clinical features.

⇨ **Importance of Rupa:** Knowledge of Rupa will be helpful in deciding the nature of the disease and prognosis of the disease. If the person is presented with mild clinical features, then it is easy to cure and if the person is presented with severe clinical features, then it is difficult to cure.

⇨ **Importance of Upashaya:** Upashaya will be helpful in diagnosing the diseases where we will face difficulty with two or multiple diseases with similar clinical features such as Vatavyadhi and Urustambha by applying the Snehana. If the condition improves, then Vatavyadhi is diagnosed and if condition worsens, then Urustambha can be diagnosed.

⇨ **Importance of Samprapti:** We can plan the treatment of the patient so that accurate and complete recovery from the illness can be achieved.

Probable questions may be asked in the examination

Long essays

- ⇨ What are Nidana Panchaka? Explain the importance of Nidana Panchaka in clinical practice or in Roga Nidana
- ⇨ How Nidana Panchaka helps in Roga Pariksha, elaborate the types of Samprapti
- ⇨ What are Nidana Panchaka and explain the importance of Nidana in Roga Nidana
- ⇨ Enumerate Nidana Panchaka and explain the importance of Purvarupa in Roga Nidana
- ⇨ Name Nidana Panchaka and explain the importance of Samprapti in Roga Nidana
- ⇨ Enumerate Pancha Lakshana Nidana and explain the importance of Nidana
- ⇨ Describe the importance of Pancha Nidana with its application on a particular disease.
- ⇨ Write the importance of Nidana Panchaka and explain definition, types with example of Rupa

Short essays

- ⇨ Explain the importance of Nidana in current practice
- ⇨ Explain the importance of Purvarupa in Roga Nidana
- ⇨ Explain the importance of Upashaya with suitable examples
- ⇨ Explain the importance of Samprapti with suitable examples
- ⇨ Explain the importance of Upashaya
- ⇨ Importance of Nidana Panchaka

Short answers

- ⇨ Enumerate Nidana Panchaka
- ⇨ Enumerate Pancha Lakshana Nidana
- ⇨ Explain 'Sankshepatah Kriyayogo Nidana Parivarjanam'
- ⇨ Explain the importance of Purvarupa

MCQs

1. **Which of the following is not true regarding Nidana Panchaka?**
   a. Roga Pariksha;
   b. Pancha Lakshana Nidana;
   c. Rogi Pariksha;
   d. All of the above
   Answer -(c)
2. **Sankshepatah Kriyayogo Nidana Parivarjanam is the contribution of**
   a. Charaka;
   b. Sushruta;
   c. Vagbhata;
   d. Bhava Prakasha
   Answer -(b)
3. **Kapha Dosha is dominant in 20 years old individual. This is an example of**
   a. Achayapurvaka Prakopa;
   b. Sannikrishta Hetu;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
4. **Which of the following word describes pathogenesis of the disease?**
   a. Nidana;
   b. Samprapti;
   c. Purvarupa;
   d. Upashaya
   Answer -(b)
5. **Diagnosis of Raktapitta and Prameha is done by observing ....of two diseases.**
   a. Nidana;
   b. Purvarupa;
   c. Upashaya;
   d. All of the above
   Answer -(b)

***

Concept of Nidana

3

Learning objectives

- ⇨ To know the understanding of the word Nidana
- ⇨ To understand the pathological events happen during Nidana Sevana
- ⇨ Synonyms of Nidana
- ⇨ Types of Nidana as mentioned in different Ayurvedic literatures and their relevance
- ⇨ Relevance of Nidana in the present era and its relevance

Meaning of Nidana

निदानं कारणमिहोच्यते, तच्चेह व्याधिजनकं व्याधिबोधकं च सामान्येनोच्यते।
तत्र व्याधिजनकं निदानं हेतुः, व्याधिबोधकं च कारणं निदानपूर्वरूपरूपोपशयसंप्राप्तिरूपम्।
तत्र हेतुरूपं निदानं जनकं च भवति, व्याधेर्बोधकं च भवति। अत

Cha.Ni. – 1/2, Chakra

निदानम्। निदाननिरुक्तिं प्रतिपादयन्नाह-हेत्वित्यादि। हेतव इति कारकहेतवः; बलवद्विग्रहक्रोधदिवास्वप्नादयः; लक्षणानि ज्ञापकहेतवः; ते च पूर्वरूपरूपोपशयसंप्राप्तयः। निर्देशात् विवरणात्॥13-14॥

Su.Su. 3/13-14, Dalhana

'निर्दिश्यते व्याधिनेनेति निदानं'

Ma.Ni. 1/4, Madhu

''निश्चित्य दीयते प्रतिपाघते व्याधिरनेनेति निदानं''

Ma.Ni. 1/4, Madhu

हेतुलक्षणनिर्देशान्निदानानीति। Su.Su. – 3/14

'व्याधिनिश्चयकरणं निदानं' Ma.Ni. – 1/4, Madhu

'सेतिकर्तव्यताको रोगोत्पादकहेतुर्निदानं'

Ma.Ni. 1/5, Madhu

- ⇨ There are two different meanings for the word '*Nidana*'. First one being the diagnostic methods as per classics and the second one being the causative factor. Former one is called *Vyadhi Bodhaka Nidana* or *Jnapaka Hetu* and the latter one is considered as *Vyadhi Utpadaka Hetu* or *Karaka Hetu*. *Vyadhi Bodhaka Hetu* are *Nidana*, *Purvarupa*, *Rupa*, *Upashaya* and *Samprapti*. *Vyadhi Janaka Hetu* is *Nidana* only. *Vyadhi Bodhaka Hetu* is helpful in diagnosing the disease at different levels either at *Nidana* (aetiology) level, *Purvarupa* (prodromal symptoms) level, *Rupa* (symptoms) level, *Upashaya* (diagnosis by trial and error method) level or *Samrpapti* (pathogenesis) level either individually or in combinations. *Vyadhi Janaka Hetu* is giving us the information on causative factor or *Nidana* only. As per the descriptions, *Vyadhi Janaka Hetu* can be included in *Vyadhi Bodhaka Hetu*, but the vice versa is not possible.
- ⇨ **Concept of Nidana** is discussed elaborately to enable the accurate diagnosis and easy management of the disease and to predict the prognosis of the disease. For example, if the person is indulging in the over consumption of *Kadali* (banana) usually leads to the increase of *Kapha Dosha* as *Kadali* is having the properties of *Madhura Rasa*, *Guru* and *Snigdha Guna*, *Sita Virya* and *Madhura Vipaka*. If the person is continuously consuming the same *Nidana*, that person is likely to develop the *Kapha Pradhana Vikara*.
- ⇨ As far as practices of fundamentals of *Roga Nidana* are concerned, the assessment of *Nidana* is not that simple, because of

effect of different *Rasa, Guna, Virya, Vipaka* and *Prabhava* of *Nidana* on the body; the nature of different *Ahara* in its raw form and cooked form; ingredients used in the preparation of the food; proportion of food ingredients during the consumption of food; the amount of *Nidana Sevana* at a particular time; duration of the *Nidana Sevana*; the status of the society where the person lives; the status of *Manas* during consumption of *Nidana*, age and gender of the patient, the strength of the diseased individual at the time of assessment etc.

- ➩ Let us further evaluate the above said example of consumption of *Kadali* (banana). If 20 years old male patient who is of *Kapha Prakriti* consumes 3 banana in January, also consumes 2 glasses of lassi (a drink prepared by curds and sugar) around 10 pm, then vitiation of *Kapha Dosha* will be to the maximum extent. In this example, the person is having *Kapha Prakriti*, time of intake is January, age of individual is having the dominance of *Kapha Dosha*, and also consumes lassi that too at the time of getting sleep at night. All these factors are favouring the vitiation of the *Kapha Dosha*.
- ➩ 50 years old male patient of *Pitta Prakriti* consumes 3 bananas in summer season, at around 10 pm, there may be very negligible degree of *Kapha Dosha* vitiation, as the time, *Prakriti* are not similar to the qualities of banana.

Meaning of Nidana

Nidana performs various abnormal functions in the body thereby responsible for the manifestation of the disease in the living beings. As per *Sadashiva Sharma*, an eminent *Ayurveda* expert, the word *Kartavyata* is explained elaborately. Consumption of *Ruksha* etc *Guna* are responsible for *Prakopa* (vitiation) of *Vata* leading to the vitiation of *Dushya* (*Dhatu* and *Mala*) and *Amashaya* etc *Ashaya*. This leads to the manifestation of the disease in due course of time.

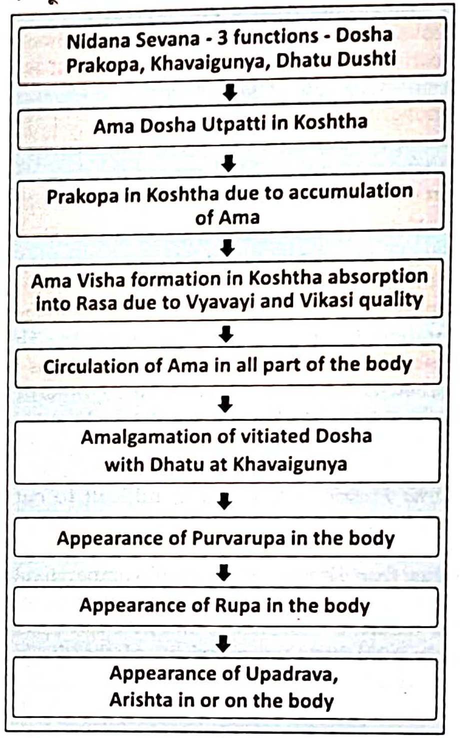
- ➩ If the person consumes the food substances which has *Ruksha* quality for example, bitten rice (*Poha* in Hindi) responsible for *Vata* vitiation in the *Koshtha* itself initially. This will be followed by the circulation of vitiated *Vata* and lodges at one particular place due to *Khavaigunya* and mixes with *Dushya* and starts the process of *Dosha Dushya Sammurchana*.
- ➩ If 23 years old male patient having *Vata Prakriti* is going for walking at 5 am in the early phase of January in Varanasi, he is exposed to air having *Ruksha* and *Shita* quality. In this occasion, the main *Srotas* afflicted to be *Pranavaha Srotas*.
- ➩ If 34 years old male patient of *Kapha Prakriti* is going for walking at 5 am in early phase of January in Varanasi without covering his body with sufficient clothes, then *Ruksha* and *Shita* quality of air shows changes not only in *Pranavaha Srotas* even in *Rasavaha Srotas* as there will be cracks in the skin can be seen.
- ➩ *Dosha* vitiation cannot occur in all occasions before the manifestation of the disease. *Abhighata* is one such example. *Abhighata* (trauma to any part of the body) is responsible for the vitiation of *Rakta Dhatu* first and *Vata* vitiation takes place due to loss of *Rakta* (blood). In this occasion, first there will be manifestation of the symptoms followed by vitiation of *Dosha*. Further, there will be commencement of vitiation of *Dosha* after 7 days.

Characters of Nidana

अन्यथा सिद्धिशून्यस्य नियता पूर्ववर्तिता।
कारणत्वं भवेत्तस्य ....॥
कारिकावली
अन्यथासिद्धिशून्यत्वे सति कार्याव्यवहितप्राक्
क्षणावच्छेदेन नियमेन विद्यमानत्वं कारणत्वं ....॥
मयूर टीका

A cause is the one which is unconditionally, invariably and immediately responsible for the production of effect. In other words, a cause is the invariable antecedent of a given phenomenon.

- ➩ अव्यवहित प्रत्यासत्ति – immediacy
- ➩ अन्यथा सिद्धिशून्यता – unconditionality
- ➩ नियतत्व – invariability
- ➩ पूर्ववर्तिता – antecedency


Nidana Sevana - 3 functions - Dosha Prakopa, Khavaigunya, Dhatu Dushti
Ama Dosha Utpatti in Koshtha
Prakopa in Koshtha due to accumulation of Ama
Ama Visha formation in Koshtha absorption into Rasa due to Vyavayi and Vikasi quality
Circulation of Ama in all part of the body
Amalgamation of vitiated Dosha with Dhatu at Khavaigunya
Appearance of Purvarupa in the body
Appearance of Rupa in the body
Appearance of Upadrava, Arishta in or on the body

Flowchart 3.1: pathological events happen during exposure to Nidana

Let us learn this concept with an example. When a person consumes 100 gms of *Draksha* (grapes), it has *Madhura Rasa* (sweet taste), *Guru* (heavy to digest), *Snigdha* (unctuousness) *Guna*, *Shita Virya* (cold potency) and *Madhura Vipaka* (end stage of digestion is *Madhura*), this unconditionally, invariably and immediately leading to the vitiation of *Kapha Dosha* in the body and in *Pranavaha Srotas* and *Annavaha Srotas*. Consumption of *Draksha* will not lead to the vitiation of either *Vata* or *Pitta Dosha* because all the qualities pertaining to *Draksha* are similar to the qualities of *Kapha Dosha*, even though *Shita* (cold) quality is also present in *Vata Dosha* and *Snigdha* (unctuousness) quality is present in *Pitta Dosha*, these *Dosha* (bodily bioenergies) are not going to rise in the body because of other qualities of *Kapha Dosha* in the substance. This has to be applied to other aetiological factors and other *Doshas* too.

Synonyms of Nidana

निमित्तहेत्वायतनप्रत्ययोत्थानकारणैः।
निदानमाहुः पर्यायैः। Ma.Ni. 1/5
योनिमूलमुखप्रकृत्यादयो हेतुपर्याया बोद्धव्याः,
Ca.Ni. 1/3, Chakra

Synonyms of Nidana

Hetu (aetiological factor), *Nimitta* (responsible factor), *Ayatana* (a place of entry of the disease), *Pratyaya* (reason), *Utthana* (the factor that has caused the beginning or origin), *Karana* (cause of the disease), *Karta* (creator of disease), *Karaka* (creator), *Mula* (root cause), *Yoni* (origin), *Mukha* (origin or one end), *Prerana* (inspiration to commencement of the disease) are the synonyms of *Nidana*.

Types of *Nidana*: The types of *Nidana* are explained in the order as explained in *Madhukosha* commentary of *Madhava Nidana*.

- ➩ **4 types–** *Sannikrishta, Viprakrishta, Vyabhichari, Pradhanika* based on duration of the occurrence of symptoms in relation to *Dosha* vitiation
- ➩ **3 types–** *Asatmyendriyartha Samyoga, Prajnaparadha, Parinama* based on the nature of exposure of etiological factors in diseased individuals
- ➩ **3 types–** *Doshahetu, Vyadhihetu*, Ubhayahetu based on the effect of etiological factors on *Dosha, Dushya*
- ➩ **2 types–** Utpadaka, Vyanjaka based on provocative factors may or may not be associated with influence of the season on the human body

- **2 types–** *Bahya, Abhyantara* based on extrinsic and intrinsic factors
- **2 types–** *Prakrita, Vaikrita* based on the aggrevation of the symptoms in different seasons
- **2 types–** *Anubandhya, Anubandha* based on chronology of clinical presentation
- **2 types–** *Sadharana, Asadharana* based on the effects observed in certain group of individuals and individual exposure
- **2 types–** *Sama* and *Nirama* (based on presence of Ama)
- **1 type–** *Ashayapakarsha* based on the nature of atypical clinical presentation
- **Based on** *Doshagati–* this will be helpful in predicting the actual status of the disease, location of the disease, prognosis of the disease and planning the line of management
    - *Kshina, Vriddha, Sthana*
    - *Urdhwa, Adha, Tiryak*
    - *Shakha, Marmasthisandhi, Koshtha*
- **2 types –** *Asanna* and *Viprakrishta* (as per *Arunadatta* in A.Hr.Su. – 1/22)
    - *Asanna* – **2 types** – *Asanna* and *Pratyasanna*
- **2 types –** *Antaranga* and *Bahiranga* (as per *Hemadri* in A.Hr.Su. – 1/6)
- **4 types of** *Hetu: Sannikrishta, Viprakrishta, Vyabhichari, Pradhanika*

यदाह उपकल्पनीयाध्याये हरिचन्द्रः - सन्निकृष्ट-
विप्रकृष्टव्यभिचारिप्राधानिक भेदाच्चतुर्धा - इति॥

मा.नि. - 1/5, मधु

Sannikrishta Hetu

सन्निकृष्टो यथा नक्तं दिनर्तुभुक्तांशा दोषप्रकोपस्य हेतवः,
न ते चयादिकमपेक्ष्यन्ते। सन्निकृष्टो ज्वरस्य रूक्षादिसेवा॥

मा.नि. - 1/5, मधु

The word meaning '*Sannikrishta*' refers to near. So the word *Sannikrishta Hetu* refers to nearest cause to the manifestation of the disease. In other words, the person will suffer from the disease in short time when he comes in contact with the aetiological factor. This concept is best understood by the concept of *Achaya Purvaka Prakopa* i.e. *Chayavastha* is not essential for the *Prakopa* of the *Dosha*. That means this type of *Nidana* is usually present in the individuals from the beginning itself. The examples given for *Sannikrishta Nidana* are explained in the classics. *Kapha Dosha* is dominant in childhood, in early part of day and early part of night and immediately after taking food; *Pitta Dosha* is dominant in middle age, noon, midnight and during the digestion of food and *Vata Dosha* is dominant in old age, late part of the day, late part of the night and after the digestion of food.

If the child developing the *Kapha Dosha Prakopa*, it is little bit difficult to pacify the *Kapha* as there is natural increase of *Kapha Dosha* and requires strong and potent medicine for longer duration to pacify the vitiated *Dosha*. The *Dosha Prakopa arised* out of these situations is termed as *Sannikrishta Nidana*. The significance of knowing *Sannikrishta Nidana* is to assess the *Sadhyasadhyata* of the disease in relation to *Dosha*. For example, *Kaphaja Vikara* in children, *Kapha Prakriti* individuals is difficult to cure and *Kaphaja Vikara* in middle aged people and old aged people and in the people of *Prakriti* other than *Kaphaja Prakriti* will comparatively show better response when you administer the medicines. The above said descriptions are only guidelines, management of the disease involves multiple factors.

Viprakrishta Hetu

विप्रकृष्टो यथा हेमन्ते निचितः श्लेष्मा वसन्ते कफरोगकृत्॥
किंवा विप्रकृष्टो रुद्रकोपः॥ मा.नि. - 1/5, मधु

The word '*Viprakrishta*' refers to far. So the word *Viprakrishta Hetu* refers to farthest cause to the manifestation of the disease when compared to *Sannikrishta Hetu*. Based on the concept of *Kriyakala*, this type of *Hetu* is best understood by the concept of *Chayapurvaka Prakopa* i.e. to have vitiation of *Dosha*, first there will be *Sanchayavastha* of *Dosha*. E.g. There will be *Kapha Pradhana Roga* will be manifested in *Vasanta Ritu* because of the *Sanchaya* of *Kapha* occurs in *Hemanta Ritu*. The aggrevation of *Swasa* in *Tamaka Swasa* soon after *Dhuma Sevana*, *Dhuma Sevana* is considered to be *Viprakrishta Karana*. The following table describes the *Viprakrishta Hetu* for *Sharirika Doshas*. For example, the *Ruksha Sevana* in *Varsha Ritu* is responsible for the *Prakopa* of *Vata Dosha*. There will be already the accumulation of *Vata Dosha* during the *Grishma Ritu*. (A.Hr. reference).

Table 3.1: Relation between Dosha vitiation and different seasons

Dosha	Chaya	Prakopa	Prashama
Vata	Grishma	Varsha	Sharath
Pitta	Varsha	Hemantha	Shishira
Kapha	Shishira	Vasanta	Grishma

Vyabhichari Hetu

व्यभिचारी यथा - यो दुर्बलत्वात् व्याधिकरणासमर्थः।
यदाह चरकः - (निदानादिविशेषा) अबलीयांसो-
ऽथवानुबध्नन्ति, न तदा विकाराभिनिर्वृत्तिः इति॥

मा.नि. - 1/5, मधु

Conducive environment is necessary for *Nidana, Dosha* and *Dushya* is necessary for the manifestation of the disease. If there is no conducive environment for *Nidana, Dosha* and *Dushya*, there will be disease manifestation in varying severity. For example, *Shita* and *Snigdha Pradhana Ahara* is responsible for the vitiation of *Kapha Dosha* and there may be involvement of *Rasa, Mamsa, Meda, Majja, Shukra, Mutra* and *Purisha*; the person will be presented with the symptoms of *Kapha Pradhana Vikara*. If such a conducive environment for *Nidana, Dosha* and *Dushya* is not present, then there will be no manifestation of the disease; delayed manifestation of the disease; manifestation of the disease with mild symptoms; manifestation of the disease with incomplete or atypical symptoms. In this particular type of *Hetu*, the *Hetu* is incapable of inducing *Dosha Prakopa*.

इह खलु निदानदोषदूष्यविशेषेभ्यो
विकारविघातभावाभावप्रतिविशेषा भवन्ति।
यदा ह्येते त्रयोनिदानादिविशेषाः परस्परं नानुबध्नन्त्यथवा
कालप्रकर्षादबलीयांसोऽथवाऽनुबध्नन्ति न तदा
विकाराभिनिर्वृत्तिः, चिराद्वाऽप्यभिनिर्वर्तन्ते, तनवो वा
भवन्त्ययथोक्त-सर्वलिङ्ग वा; विपर्यये विपरीताः;

Ca.Ni. – 4/4

Pradhanika Hetu

प्राधानिको यथा - विषादिः॥ मा.नि. - 1/5, मधु

In this type of the *Hetu*, there will be rapid *Dosha Prakopa*, even the wise physicians are not in a position to identify the *Dosha Prakopa*. For example, the consumption of *Visha*.

3 types – Asatmyendriyartha Samyoga, Prajnaparadha and Parinama

त्रिविधो वा, असात्म्येन्द्रियार्थसंयोगप्रज्ञापराधपरिणाम
भेदात्॥ मा.नि. - 1/5, मधु

Asatmyendriyartha Samyoga

तत्र, असात्म्येन्द्रियार्थसंयोगोऽयोगातियोगमिथ्या-
योगयुक्ता रूपरसादयः॥ मा.नि. - 1/5, मधु

Any knowledge is attained by the proper contact of *Indriya, Indriyartha, Manas* and *Atma*. Though the term *Indriya* refers to *Jnanendriya* and *Karmendriya*, in this context, the clinician should take *Jnanendriya* only. Improper contact of *Indriya* and *Indriyartha* in the form of *Ayoga, Atiyoga* and *Mithyayoga* are responsible for the manifestation of diseases. The manifestation of the disease can be identified by abnormal functions.

Table 3.1: Atiyoga, Ayoga and Mithyayoga of different Indriyas

	Atiyoga	Ayoga	Mithyayoga
Shrotrendriya	Excess hearing of music etc	Sitting lonely in a room without hearing	Hearing different sounds in the city, horns of different vehicles

	Atiyoga	Ayoga	Mithyayoga
Ghranendriya	Smelling the substances such as Lashuna frequently and excessively	Not at all smelling the substances	Smelling the substances having fetid smell, smell of the dead body, unpleasant smell
Rasanendriya	Excess consumption of substances having one Rasa such as Madhura or Katu etc	Not at all taking any of the substances having one Rasa or any Rasa	Consumption of the substances without following the parameters mentioned in Ashta Ahara Vidhi Visesha Ayatana (except Rashi)
Chakshurindriya	Visualising the substances having more illumination power such as sunlight excessively	Not at all visualising the substances or sitting in a dark room for long time	Visualising the unpleasant situations such as earthquake, homicide or suicide etc
Sparshanendriya	Bathing with very hot water or ice cold water frequently; frequent Abhyanga, Utsadana etc line of treatment	Not at all having bath by an individual	Abnormal proportion in relation to bathing with hot and cold water; trauma to the body; contact with the unclean objects etc

Prajnaparadha

धीधृतिस्मृतिविभ्रष्टः कर्म यत्कुरुतेऽशुभम्।
प्रज्ञापराधं तं विद्यात् सर्वदोषप्रकोपणम्॥ च.शा. - 1/102
प्रज्ञापराधो हि मिथ्याज्ञानादिः॥ मा.नि. - 1/5, मधु

Prajnaparadha is the cause of diseases which results due to the improper use of *Dhi*, *Dhriti* and *Smriti*. Due to *Buddhi Vinasha*, the appropriate knowledge of various substances is not possible, for example, considering rope as serpent etc; the person's inability to identify the day or night, the person's inability to identify friends and family members. Due to *Dhriti Vinasha*, the person will not be having the knowledge about saving one's life in case of emergencies or the person is having the poor decision making capacity. Due to *Smriti Vinasha*, the person is not in a position to recollect either short term or long term memory.

उदीरणं गतिमतामुदीर्णानां च निग्रहः।
सेवनं साहसानां च नारीणां चातिसेवनम्॥103॥
कर्मकालातिपातश्च मिथ्यारम्भश्च कर्मणम्।
विनयाचारलोपश्च पूज्यानां चाभिघर्षणम्॥104॥
ज्ञातानां स्वयमर्थानामहितानां निषेवणम्।
परमौन्मादिकानां च प्रत्ययानां निषेवणम्॥105॥
अकालादेशसंचारौ मैत्री संक्लिष्टकर्मभिः।
इन्द्रियोपक्रमोक्तस्य सद्वृत्तस्य च वर्जनम्॥106॥
ईर्ष्यामानभयक्रोधलोभमोहमदभ्रमाः॥
थज्जं वा कर्म यत् क्लिष्टं क्लिष्टं यद्देहकर्म च॥107॥
यच्चान्यदीदृशं कर्म रजोमोहसमुत्थितम्॥
प्रज्ञापराधां तं शिष्टा ब्रुवते व्याधिकारणम्॥108॥
Ca.Sha. – 1/103-108

The examples given in the context of *Prajnaparadha* are as follow: these are the aetiological factors for the vitiation of *Dosha* where the person is knowingly or unknowingly, exposed to these aetiological factors.

- ⇨ *Gatimatam Udirana* – Forceful expulsion of the natural urges, especially, *Mutra* (urine), *Purisha* (faeces)
- ⇨ *Udirnanam Veganam Nigraha*– Suppression of the natural urges, especially, *Mutra* (urine), *Purisha* (faeces), *Pipasa* (thirst), *Kshudha* (hunger), *Nidra* (sleep) etc
- ⇨ *Sahasanam Sevana*– excess activity more than one's capacity
- ⇨ *Narinam Chatisevana*– excessive sexual activity
- ⇨ *Karmakala Atipata*– negligence for undergoing treatment for the disease a person is suffering from
- ⇨ *Karmanah Mithyrambha*– improper administration of the treatment
- ⇨ *Vinaya Achara lopa* – absence of modesty and good conduct from the point of patient
- ⇨ *Pujyanam Cha Abhigharshana*– showing disrespect to the elders or respectable individuals
- ⇨ *Jnatanam Svayamarthanam Ahitanam Nishevana*– exposure to the etiological factors which are harmful to the body
- ⇨ *Param Unmadikanam Pratyayanam Nishevana*– exposure to the etiological factors which are leading to the manifestation of madness
- ⇨ *Akala Desha Sanchara*– movement of the individuals in socially unacceptable place that too at unacceptable time
- ⇨ *Sanklishtakarmabhih Maitri*– having friendship with the people who have anti social activities
- ⇨ *Indriyopakramoktasya Sadvrittasya Varjana* – avoiding the activities told in the context of *Sadvritta*
- ⇨ *Irshya, Maana, Bhaya, Krodha, Lobha, Moha, Mada, Bhrama Janya Karma*– activities performed by the individual due to malice, vanity, fear, anger, greed, ignorance, intoxication and giddiness
- ⇨ *Klishta Deha Karma*– strenuous physical activity
- ⇨ *Rajo Moha Samutthita Karma*– activities performed by an individual due to *Rajo* and *Tamo Guna* dominance

Parinama

परिणामो अयोगादियुक्ता ऋतुस्वभावजाः शीतादयः॥
मा.नि. - 1/5, मधु

Hina, *Mithya* and *Atiyoga* of *Kala* – rainy season, winter season and summer season is considered to be *Parinama*. Let us take the example of rainy season. If there is poor rain in a region it results in draught, thereby the person may not have water even to drink. This leads to *Udakakshaya* in the body further leads to *Rasa Kshaya* in the body. If there is excessive rain in a region results in flood, further leads to *Oupasargika Roga* or infectious diseases. *Mithyayoga* of rainy season refers to untimely rain which disturbs the whole economy of that particular region.

Table 3.2: Atiyoga, Ayoga and Mithyayoga of different seasons

	Atiyoga	Ayoga	Mithyayoga
Rainy season	Excess rain	No rain	Appearance of cold or heat during rainy season
Winter season	Excess cold	No cold	Appearance of rain or heat during winter season
Summer season	Excess heat	No heat	Appearance of rain or cold during summer season

3 types: Dosha Hetu, Vyadhi Hetu and Ubhaya Hetu

दोषव्याध्युभयहेतुभेदाच्च स त्रिविधः।
दोषहेतवो यथा-चयप्रकोपप्रशमनिमित्ता यथर्तूत्पन्न मधुरादयः।
व्याधिहेतवो यथा-मृद्भक्षणं पाण्डुरोगस्य कारणम्।
यद्यपि मृदपि दोषं प्रकोपयत्येव; यसदुक्तं चरके,-''कषाया मारुतं पित्तमुषरामधुरा कफम् ''-इति (च.चि.स्थ.अ.16); तथापि तज्जैर्दोषैः पाण्डुरोग एवारभ्यते न त्वन्यो विकार इति व्याधिहेतुता भवति।
उभयहेतुर्यथा-वातरक्ते, ''हस्त्यश्वोष्ट्रैर्गच्छतश्चाश्नतश्च''-इत्यादि (सु.नि.स्था.अ.1)M.Ni. – 1/5, Madhu

Dosha Hetu: *Dosha Hetu* is the *Hetu* responsible for the *Chaya*, *Prakopa* and *Prashamana* of *Doshas*. For example, *Madhuradi Shadrasa* responsible for the vitiation of *Dosha*. *Madhura*, *Amla* and *Lavana* are responsible for the accumulation of *Kapha Dosha* in the body; *Katu*, *Tikta* and *Kashaya Rasa* are responsible for the depletion of *Kapha Dosha* in the body. This concept is applicable even for *Pitta* and *Vata Dosha* too.

Vyadhi Hetu: This type of *Hetu* is responsible for the manifestation of *Vyadhi* irrespective of *Dosha Prakopa*. For example, *Mrid Bhakshana* is responsible for the manifestation of *Pandu*; *Makshika Bhakshana* leads to the manifestation of *Chardi* and *Atyashana* leads to the manifestation of *Ajirna*.

***Ubhaya Hetu*:** This type of *Hetu* having two distinct functions. Among the *Hetus* mentioned, some *Hetus* are responsible for the vitiation of *Dosha* and certain other *Hetus* are responsible for the manifestation of *Vyadhi*. For example, in *Vatarakta*, certain *Hetus* are responsible for the vitiation of *Vata Prakopa* and certain other *Hetus* are responsible for the vitiation of *Rakta*, thus leading to the manifestation of *Vatarakta*. In *Ama Atirsara*, some *Hetus* are responsible for the production of *Ama* and certain other *Hetus* are responsible for the *Atisara* manifestation, thus leading to the manifestation of *Ama Atisara*.

2 types: Utpadaka Hetu and Vyanjaka Hetu

स एवोत्पादकव्यञ्जकभेदाच्च द्विधा।
तत्रोत्पादको यथा-हेमन्तजो मधुररसः कफस्य।
व्यंञ्जको यथा-तस्यैव कफस्य व्यञ्जको वसन्ते
सूर्यसन्तापः-इति भट्टारहरिचन्द्रः।
तत्र व्यञ्जकः प्रेरक इत्यर्थः। Ma.Ni. – 1/5, Madhu

***Utpadaka Hetu* (Predisposing cause):** To describe this type of *Hetu*, one has to know the Shad *Kriyakala*. If the *Hetu* is responsible for increase or vitiation of the *Dosha* in 1st stage of *Kriyakala* or *Sanchayavastha* is called *Utpadaka Hetu*. *Madhuradi Shadrasas* are considered as *Utpadaka Hetu*. *Madhura*, *Amla* and *Lavana Rasas* are *Utpadaka Hetu* for *Kaphaja Vikaras*. *Katu*, *Amla* and *Lavana* are *Utpadaka Hetu* for *Pittaja Vikaras*. *Katu*, *Tikta* and *Kashaya Rasas* are *Utpadaka Hetu* for *Vataja Vikaras*.

***Vyanjaka Hetu*: (Exciting or precipitating cause):** The *Hetu* which is responsible for the aggrevation of the symptoms in an individual. There will be *Dosha Prakopa* already existing in that individual. *Vyanjaka Hetus* are responsible for the flare up of the symptoms. For example, in *Hemanta Ritu*, there will be accumulation of *Kapha* in the body. In *Vasanta Ritu*, due to the exposure to sunrays, there will be liquefaction of the *Kapha Dosha* thereby one can observe aggrevation of the symptoms in that individual. *Sunrays* are considered to be *Vyanjaka Hetu*. The above waxing and waning of the symptoms are seen in the patients of *Tamaka Swasa*.

2 types: Bahya Hetu and Abhyantara Hetu

बाह्याभ्य-न्तरभेदाच्च द्विधा।
तत्र बाह्या आहाराचारकालादयः।
आभ्यन्तरा यथा-दोषा दूष्याश्च। Ma.Ni. – 1/5, Madhu

***Bahya Hetu* (External cause):** Unwholesome diet and regimen of a person which are responsible for the vitiation of *Dosha* are termed as *Bahya Hetu*. The detailed description of *Bahya Hetu* is being discussed in the context of *Dosha Prakopaka Hetu*.

***Abhyantara Hetu* (Internal cause):** *Dosha* and *Dushyas* present inside the body are termed as *Abhyantara Hetu*. Any illness in the body will be due to imbalance in the proportions of *Dosha* and *Dushyas*. No disease will be manifested without the existence of the *Dosha* and *Dushya*.

2 types: Prakrita Hetu and Vaikrita Hetu

दोषा दूष्याश्च। तत्र, दोषोऽपि प्रकुपितः
प्राकृतादिभेदादनेकधा। प्राकृतो यथा-वसन्ते श्लेष्मा,
शरदि पित्तं, प्रावृषि वायुः। वैकृतस्तु यथा-वसन्ते पित्तं
वायुर्वा, वर्षासु कफः पित्तं वा, शरदि कफो वायुर्वा।
अस्य प्रयोजनं सुखसाध्यत्वादि। यदुक्तं चरके,-"प्राकृतः
सुखसाध्यस्तु वसन्तशरदुद्भवः"-इत्यादि (च.चि.स्था.
अ.3)। अनुबन्ध्यबन्ध। Ma.Ni. – 1/5, Madhu

***Prakrita Hetu*:** *Prakrita Hetu* as per *Madhava Nidana*, *Madhukosha* commentary, is nothing but *Prakrita Dosha*. *Prakrita Dosha* means there will be vitiation of *Dosha* take place in the respective seasons as mentioned in the classical textbooks of *Ayurveda*. For example, *Kapha Dosha* gets vitiated during *Vasanta Ritu*; *Pitta* vitiation during *Sarat Ritu* and *Vata Prakopa* occurs during *Grishma Ritu*.

***Vaikrita Dosha*:** *Vaikrita Dosha* means there will be *Dosha Prakopa* in the seasons other than the seasons where *Dosha* vitiation occurs normally. For example, there will be vitiation of *Vata* or *Pitta* in *Vasanta Ritu*; vitiation of *Kapha* or *Vata* in *Sarat Ritu* and there will be vitiation of *Kapha* or *Pitta* during *Grishma Ritu*.

The utility of knowing *Prakrita* and *Vaikrita Dosha* is to determine *Sadhyasadhyata* of the disease in diseased individuals.

2 types: Anubandhya Hetu and Anubandha Hetu

तत्रानुबन्ध्यानुबन्धकृतो विशेषः-स्वतन्त्रो व्यक्तलिङ्गो
यथोक्तसमुत्थानप्रशमो भवत्यनुबन्ध्यः, तद्विपरीतल-
क्षणस्त्वनुबन्धः। Ca.Vi. – 6/11

Anubandhya Hetu: In this type of *Hetu*, the disease will be *Svatantra* (independent in manifestation), *Vyakta Linga* (*Lakshana* will be clearly manifested), *Yathokta samuthana* and *Prashama* (the disease will be having the manifestation as mentioned in the textbooks and cure from the disease is possible by adopting the measures told in the textbooks).

Anubandha Hetu: In this type of *Hetu*, the disease will be *Paratantra* (depends upon the primary disease), *Avyakta Linga* (*Lakshana* will not be clearly manifested), *Na yathokta samutthana* and *Prashama* (the disease will not be having the manifestation as mentioned in the textbooks and cure from the disease is not possible by adopting the measures as told in the textbooks). The disease will be cured if you give the treatment to the *Anubandhya Hetujanya Vikara*.

The utility of *Anubandhya* and *Anubandha* will be helpful to decide the primary *Dosha* responsible for the manifestation of the disease. This will be helpful to decide the plan of treatment to combat the ill effects of vitiated *Dosha*.

2 types: Sadharana and Asadharana Hetu

द्विविधो हेतुर्व्याधिजनकः प्राणिनां भवति-साधारणः,
असाधारणश्च; तत्रासाधारणं प्रतिपुरुषनियतं
वातादिजनकमाहाराद्यभिधाय बहुजनसाधारणं
वातजलदेशकालरूपं साधारणरोग- Ca.Vi. – 2/2, Chakra

As per *Ayurveda Dipika*, commentary of *Caraka Samhita*, two types of *Hetu* based on derangement at the level of community are mentioned. They are *Sadharana Hetu* and *Asadharana Hetu*. The concept is described in the context of *Janapada Udhwamsa* in *Caraka Samhita*.

***Sadharana Hetu*:** This type of *Hetu* is responsible for the manifestation of the similar illness irrespective of the different *Prakriti*, lifestyle and dietary pattern. This concept is called *Janapada Uddhwamsa*. The *Sadharana Hetus* are *Vikrita Vayu* (abnormal air), *Vikrita Jala* (abnormal water), *Vikrita Desha* (abnormal soil or place) and *Vikrita Kala* (abnormal time). Abnormalities of air, water, place and time are responsible for the affliction of the same disease irrespective of different *Prakriti*, lifestyle and dietary pattern.

***Asadharana Hetu*:** This type of *Hetu* is responsible for the manifestation of different illnesses depending upon the exposure to different causative factors. In this type of *Hetu*, the manifestation of the disease is having the relation to different *Prakriti*, lifestyle and dietary pattern etc.

2 types of *Abhyantara Hetu*: *Sama* and *Nirama Dosha*: the description of *Sama* and *Nirama Dosha* are explained elaborately in the context of description of *Ama*.

2 types – *Prakriti* and *Vikriti* depending on the vitiated *Dosha* and clinical features and *Prakriti* of an individual.

As per this description, the person who is of *Vata Prakriti* and if he suffers from *Vata* dominant disease, then such disease is considered to be difficult to cure and in a *Kapha Prakriti* individual developing *Vata* dominant disease, then such disease is easy to cure when compared to the earlier example.

1 type: Ashayapakarsha Hetu

आशयापकर्षतो यथा-यदा स्वमानस्थितमेव दोषं
स्वाशयादाकृष्य वायुः स्थानान्तरं गमयति तदा

समानस्थोऽपि स विकारं जनयति।
यदाह चरकः,-"प्रकृतिस्थं यदा पित्तं मारुतः श्लेष्मणः क्षये।
स्थानादादाय गात्रेषु यत्र यत्र विर्पति॥
तदा भेदश्च दाहश्च तत्र तत्रानवस्थितः।
गात्रदेशे भवत्यस्य श्रमो दौर्बल्यमेव च"-इति
(च.सू.स्था.अ.17)।

यस्य प्रयोजनं वातस्यैव तत्र विगुणस्य स्वस्थानानयनं कार्य, नतु पित्तस्य ह्रासनं; "ये त्वेनां पित्तस्य स्थानाकृष्टिं न विदन्ति ते दाहोपलम्भेन पित्तवृद्धि मन्यमानाः पित्तं ह्रासयन्तः पित्तक्षयलक्षणं रोगान्तरमेवोत्पादयन्त आतुरमतिपातयन्ति" इति भट्टारहरिचन्द्रः।
Ma.Ni. – 1/5, Madhu

In the concept of *Ashayapakarsha*, one *Dosha* will be in the normal proportion, second *Dosha* will be in the decreased state and *Vata* will be in increased state due to the decreased *Dosha*. Because of the increased *Vata Dosha*, there will be movement of *Dosha* of normal proportion to other distant places. This displacement of normal *Dosha* is responsible for the manifestation of the symptoms of displaced *Dosha* in the respective sites.

The main treatment principle in this context is one should not give the treatment for the *Lakshana* of displaced *Dosha*, one has to give treatment for the increased *Vata Dosha*.

2 types: *Arunadatta* explained 2 types of *Nidana* – *Asanna* and *Viprakrishta*.

तच्चासन्नविप्रकृष्टभेदेन द्विधा।
आसन्नमपि द्विविधम्, आसन्नात्यासन्नभेदेन।
आसन्न रूक्षलघुशीता-दिद्रव्योपयोग।
अत्यासन्न तु यत समनन्तरमेव रोगोत्पत्ति।
यथा वातादयो दोषा कुद्धा।
विप्रकृष्ट यत् आदि A.Hr.Su. – 1/22, Arunadatta

Asanna **type of** *Nidana* **is again of 2 types** – *Asanna* and *Atyasanna*. The use of *Ruksha, Laghu, Sita* etc drugs is the example given for *Asanna Nidana*. Whereas vitiated *Dosha* is the example given for *Atyasanna Nidana*. *Rudrakopa* in the manifestation of *Jvara* is the example given for *Viprakrishta Nidana*.

2 types: ***Hemadri*** **explained 2 types of** *Nidana* – *Antaranga* and *Bahiranga*.

हेतुर्द्विवा, अन्तरङ्गो बहिरङ्गश्चेति।
अन्तरङ्गो द्विधा, दोषा दूष्याश्चेति।
A.Hr.Su. – 1/6, Hemadri

Antaranga Nidana **is the internal cause. It is of 2 types** – *Dosha* and *Dushya*. Whereas *Bahiranga Nidana* is responsible for the *Dosha Dushya Sammurchana*. It is of 2 types – *Vriddhi Hetu* (causes responsible for increase of *Dosha* and *Dushya*) and *Kshaya Hetu* (causes responsible for the decrease of *Dosha* and *Dushya*).

2 types – *Nija* and *Agantuja* based on the nature of etiological factor and clinical presentation, *Nidana* are of two types, *Nija* and *Agantuja*. *Nija Nidana* are those which are responsible for the vitiation of the *Dosha* before the manifestation of discomfort where *Agantuja Nidana* are those which lead to discomfort first which will be followed by vitiation of *Dosha* in the body after due course of time. As per literature, the *Nija Nidana* are abnormal proportion of *Vata, Pitta* and *Kapha*. *Agantuja Nidana* are injury to the body via nails, bite, fall from height, trauma, burn, weapon or surgical insturments etc.

2 types – Naishthika and Laukika

Naishthiki Hetu is the kind of *Hetu* which is leading to *Moksha* (the ultimate liberation). *Laukiki Hetu* is the kind of the *Hetu* which leads to discomfort in the present life itself.

***Doshagati*:** The concept of *Doshagati* is discussed elsewhere in the text in the context of *Doshagati* and *Rogamarga* along with suitable examples.

Relevance of the knowledge of Nidana in the present era

- ⇨ The knowledge of *Sannikrishta Nidana* will be helpful in deciding the dominance of the *Dosha* at the time of the onset of the disease. This can be assessed depending upon the time of the digestion, diurnal variation and age.
    - ❑ For example, in elederly people, there will be dominance of the *Vata*. In the middle aged people aged between 30 – 60 years will be having the dominance of *Pitta*. Individuals between age group of 0 – 30 years will be having the dominance of *Kapha Dosha*. In other words, in people aged between 60 till death *Vataja* diseases will be seen and in the age group of 30 – 60 years, *Pittaja* diseases are observed and in individuals aged between 0 – 30 years *Kaphaja Vikara* are observed.
    - ❑ Take the example of diurnal variation and dominance of the *Dosha*. *Vata Dosha* dominance is seen during the evening and early morning. *Pitta Dosha* dominance is seen in midnight as well as mid noon from 11 am to 2 pm. *Kapha Dosha* dominance is seen during late evening at around 6 pm to 11 pm and 6 am to 11 am. 25 years old individual gets the worsening of the symptoms at 12 in the midnight, then it suggests the dominance of *Pitta* in the pathogenesis of the disease.
    - ❑ If we take the example of digestion of food and dominance of *Dosha*, *Kapha Dosha* dominance is seen soon after the intake of the food, *Pitta Dosha* dominance is seen during the digestion of food and *Vata* dominance is seen soon after the digestion of food. For example, 30 years old individual presented with the abdominal pain after 2 hours of food intake, suggests the dominance of Pitta as this is the period of the digestion of the food.
- ⇨ In the context of *Pradhanika Hetu, Abhighata* (trauma) is responsible for the *Raktakshaya* and *Vata Prakopa* and is responsible for different clinical manifestations depending upon the area of *Abhighata*. If *Abhighata* occurs to the back at the region of *Kukundara Marma, Adha Shakha Karma Kshaya* (loss of movement of lower limbs) occurs.
- ⇨ Let us take the example of *Asatmya Indriyartha Samyoga* in the context of *Shrotrendriya*. If the person is hearing the music excessively that too in loud voice, this is responsible for the reduced functioning of the hearing faculty. In this occasion, the ideal line of management is to reduce the use of *Shrotrendriya* i.e. to reduce the hearing of the music.
- ⇨ Let us take the example of activity performed because of the *Moha* (ignorance) in the context of Prajnaparadha.
    - ❑ In the occupation of the farmer, what type of crop to be grown in rainy season, what type of crop should be selected for the purpose of agriculture. If poor quality of crop is selected, that will lead to improper health of the people who consume food substances of poor quality.
    - ❑ Let us take the occupation of physician, in the patient who is suffering from *Saama* stage of *Amavata*, the ideal line of treatment in this situation is *Dipana* and *Pachana* therapy. In stead, if the physician administers *Abhyanga* (body massage) not performing *Dipana* and *Pachana*, that will lead to the worsening of the clinical situation.
- ⇨ In the context of *Dosha Hetu, Shadrasayukta Ahara* at improper proportions are responsible for *Dosha Prakopa*. For example, if a person of *Kapha Prakriti* is consuming the substances having *Madhura Rasa* only, then that person is likely to have vitiation of *Kapha Dosha*. If the person of *Kapha Prakriti* is consuming *Amla Rasa* only, then that individual is likely to have moderate vitiation of *Kapha* and *Pitta Dosha*. Practically speaking, such situations are rare because food substances prepared will have more than one *Rasa* in almost all occasions.
- ⇨ In the context of *Vyadhi Hetu*, the consumption of etiological factor will not only vitiate the *Dosha*, but it also responsible for the abnormality in *Dhatu* and *Mala* too. For example, in case of consumption of mud, there will be vitiation of *Pitta* as well

as abnormality in *Rasa Dhatu*.

- ⇨ *Utpadaka* and *Vyanjaka Hetu* are etiological factors where in *Utpadaka Hetu*, the person will be exposed to the etiological factor for the first time and in case of *Vyanjaka Hetu*, the person will be exposed to the etiological factors for repeated times. In other words, during the exposure to *Vyanjaka Hetu*, the suffering individual will be already having sub optimum vitiation of Dosha necessary for manifestation of disease.
- ⇨ The knowledge of *Bahya Hetu* will be helpful in identifying the actual etiological factor responsible for the causation of disease, thereby by avoiding the etiological factor is itself a primary management of the disease. If one can identify *Ruksha Bhojana* for *Vata* dominant disease, by avoiding consumption of *Ruksha Bhojana*, one can suppress or mitigate the disease produced by *Vata* vitiation.
- ⇨ As already stated earlier, the term *Abhyantara Hetu* refers to abnormal proportions of *Dosha*, *Dhatu* and Mala inside the body. The knowledge of *Abhyantara Hetu* will be helpful in determining the strength of the ailing individual, stage of the disease, prognosis of the disease, line of the treatment. For example, if the person is presented with pain in the epigastrium and sour eructations associated with unformed stools, it suggests that vitiated *Dosha* is moving in two distinct directions, which require methodical approach to check the movement in both directions. This kind of treatment is comparatively difficult when compared to the person suffering from either pain in epigastrium and sour eructations only or suffering from unformed stools only. This will be suggestive of unidirection of the movement of *Dosha* inside the body.
- ⇨ For the purpose of early diagnosis of the disease and to ease the line of treatment, several subclassifications of *Abhyantara Hetu* are explained in the text. For example, *Anaha* (distension of the abdomen) will be observed in the state of increased *Vata Dosha*. This is seen in *Vriddha* (increased) state of *Dosha*. Presence of discolouration of skin with itching suggestive of involvement of *Bahya Rogamarga*. This suggests the involvement of *Shakhagati*. Presence of vomiting (*Chardi*) is suggestive of upward movement of vitiated *Dosha*. Presence of diarrhoea in an individual is suggestive of downward movement of vitiated *Vata Dosha* and affliction of *Purisha* also. If the clinician observes the sinking of the faecal matter in the water implies the *Saamatva* of disease.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya, Madhava Nidana excerpts

Key points of the chapter

- ⇨ The term Nidana is used in two different contexts – one in the context of etiological factor and other in the context of means of diagnosis.
- ⇨ 'सेतिकर्तव्यताको रोगोत्पादकहेतुर्निदानं' Ma.Ni. 1/5, Madhu Nidana is the one which is responsible for the manifestation of the disease by performing various functions in the body which lead to abnormality in the Dosha level.
- ⇨ Several classifications of Nidana are explained in Madhava Nidana. The description mentioned above is the order of mentioning of classification of Nidana mentioned in Madhukosha commentary of Madhava Nidana.

4 types – Sannikrishta, Viprakrishta,

Vyabhichari and Pradhanika;

3 types – Asatmyendriyartha Samyoga, Prajnaparadha, Parinama;

3 types – Doshahetu, Vyadhihetu, Ubhayahetu;

2 types – Utpadaka and Vyanjaka;

2 types – Bahya and Abhyantara;

2 types – Prakrita and Vaikrita;

2 types – Anubandhya and Anubandha;

2 types – Sadharana and Asadharana;

2 types – Sama and Nirama;

1 type – Ashayapakarsha. Each of the classification of Nidana is explained along with examples.

Probable questions may be asked in the examination

Long essays

- ⇨ Describe Hetu in detail
- ⇨ Describe definitions of Hetu, synonyms and its classification
- ⇨ Describe Hetu
- ⇨ Describe in detail the classification of Hetu
- ⇨ Define Hetu, write the synonyms and explain classification in detail
- ⇨ Explain in detail about the definition, classification and synonyms of Nidana and its importance

Short essays

- ⇨ Explain Nidana
- ⇨ Definition and classification of Nidana
- ⇨ Classify Nidana
- ⇨ Trividha Nidana
- ⇨ Chaturvidha Nidana
- ⇨ Classification of Hetu
- ⇨ Explain about Sannikrishta Hetu
- ⇨ Write about Abhyantara Hetu
- ⇨ Write about Ashaya Apakarshana
- ⇨ Explain Parinama as a Hetu
- ⇨ Describe Parinama as a Hetu in detail
- ⇨ Define Nidana and classify it
- ⇨ Hetu Vargikarana
- ⇨ Discuss – Vyadhi Hetus
- ⇨ Describe Asatmyendriyartha Samyoga as a Hetu
- ⇨ Explain Prajnaparadha

Short answers

- ⇨ Hetu Paryaya
- ⇨ Prajnaparadha
- ⇨ Sannikrishta Hetu
- ⇨ Utpadaka and Vyanjaka Hetu
- ⇨ Anubandhya and Anubandha
- ⇨ Ashayapakarshana
- ⇨ Ashayapakarsha Hetu
- ⇨ Ashayapakarsha Gati
- ⇨ Viprakrishta Hetu
- ⇨ Vyadhi Hetu
- ⇨ Vyabhichari Hetu
- ⇨ Pradhanika Hetu
- ⇨ Dosha Hetu
- ⇨ Parinama
- ⇨ Write Ashayapakarsha Gati

MCQs

1. **Pitta Dosha is dominant in 35 years old individual. This is an example of**

   a. Sannikrishta Hetu;

   b. Viprakrishta Hetu,

   c. Vyabhichari Hetu;

   d. Pradhanika Hetu

   Answer -(a)

2. **Example given for Pradhanika Hetu as per Madhava Nidana is**

   a. Surya Santapa (sun light);

   b. Kadali (banana)

c. Visha (poison)
d. Ratri Jagarana (awakening at night time

Answer -(c)

3. **The vitiation of Pitta Dosha occurs in which of the following season?**
a. Vasanta Ritu;
b. Sharat Ritu;
c. Grishma Ritu;
d. Hemanta Ritu

Answer -(b)

4. **Occurrence of rain in the summer season is an example of**
a. Mithyayoga of Parinama;
b. Atiyoga of Parinama;
c. Ayoga of Parinama;
d. Mithyayoga of Prajnaparadha

Answer -(a)

5. **Excess consumption of mud in the patient of Pandu is an example of**
a. Sannikrishta Hetu; Dosha Hetu;
c. Vyadhi Hetu;
d. Utpadaka Hetu

Answer -(c)

6. **Which of the following is not considered as Sadharana Hetu?**
a. Jala;
b. Desha;
c. Kala;
d. Agni

Answer -(d)

7. **The term Abhyantara Hetu refers to**
a. Dosha only;
b. Dosha and Dhatu only;
c. Dosha, Dhatu and Mala only;
d. None of the above

Answer -(c)

8. **Which of the following Hetu is considered as weakest?**
a. Sannikrishta Nidana;
b. Viprakrishta Nidana;
c. Vyabhichari Nidana;
d. Pradhanika Nidana

Answer -(c)

9. **Nidanas of which of the following is/are the example/s for Ubhaya Hetu?**
a. Vatarakta;
b. Amavata;
c. Both 1 and 2;
d. None of the above

Answer -(c)

10. **Which of the following is not the synonym of Nidana?**
a. Atanka;
b. Utthana;
c. Pratyaya;
d. Prakriti

Answer -(a)

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Purvarupa

4

Learning objectives

- ⇨ To know the meaning of Purvarupa
- ⇨ To know the types of Purvarupa
- ⇨ To know the current understanding of Purvarupa

***Purvarupa* is comprised of two words–** *Purva* and *Rupa*. The word *Purva* means prior or earlier and the word *Rupa* refers to symptoms. In total, the word *Purvarupa* refers to the symptoms or signs or *Lakshana* observed before the manifestation of any disease.

Purvarupa is the symptom observed in the patient prior to the complete manifestation of the disease. This is also termed as premonitory symptom. Usually the *Purvarupa* is either in mild form or unmanifested form or poorly manifested form, so that forthcoming disease is not clearly identified during *Purvarupa* stage.

Purvarupa is manifested during fourth stage of *Kriyakala* i.e. *Sthanasamshrayavastha*. *Purvarupa* begins to manifest when *Dosha Dushya Sammurchana* commences. In this stage, the dominant *Dosha* cannot be easily identified.

For example, if the person is having the complaint of *Vibandha* (constipation) initially, one can predict the forthcoming *Atisara*, but it is not possible to diagnose whether it *Vataja* or *Pittaja* or *Kaphaja Atisara*.

According to *Parashara*, *Purvarupa* is the symptom which suggests the forthcoming disease, not the vitiating *Dosha*.

Synonyms of Purvarupa

रूपादय एव हि पूर्वशब्द-युक्ताः पूर्वरूपपर्याया भवन्ति;।

Ca.Ni. – 1/9

Purvasamsthana, *Purvavyanjana*, *Purvalinga*, *Purvachihna*, *Purva Akriti*, *Purvalakshana*, *Praksamsthana*, *Prakvyanjana*, *Prak Linga*, *Prak Chihna*, *Prak Akriti*, *Purassara*.

Types of Purvarupa

2 types –a. *Samanya* b. *Vishishta*

a. ***Samanya Purvarupa***: *Samanya Purvarupa* is a group of pre monitory symptoms which occur in *Sthanasamshrayavastha* prior to the manifestation of the diseases. In this type, it is not possible to identify the dominant *Dosha* responsible for the manifestation of the disease. *Charaka* opines that if all the *Purvarupas* mentioned in the classics for a particular disease are observed in the patient at a particular time is considered to be *Arishta Lakshana*. E.g. *Srama* (exhaustion), *Arati* (restlessness), *Vivarnata* (discolouration), *Vairasya* (altered taste perception), *Nayanaplava* (watering from the eyes) etc are considered as *Samanya Purvarupa* of *Jvara*.

b. ***Vishishta Purvarupa***: In *Vishishta Purvarupa*, by observing the pre monitory symptoms, the *Dosha* predominance can be identified in a particular disease. For example, *Atyartha Jrimbha* (excessive yawning) is *Purvarupa* observing in case of *Vataja Jvara*; *Nayanadaha* (burning sensation around eyes) is seen in *Pittaja Jvara* and *Ananna Abhinandana* (tastelessness) is seen in *Kaphaja Jvara*.

3 types– *Sharira*, *Manasa* and *Sharira Manasa*
A.Hr. Ni. ¼; *Sarvanga Sundara* commentary

a. ***Sharira Purvarupa***: *Purvarupa* or pre monitory symptoms which are of *Sharirika* (physical) in nature. *Alasya* (laziness), *Asyavairasya* (altered taste perception in the mouth), *Gatragourava* (heaviness of part of the body or whole body), *Jrimbha* (yawning), *Sasravakulakshita* (eyes filled with tears) in the patient of *Jvara* are the example of *Sharirika Purvarupa*.

b. ***Manasa Purvarupa***: *Purvarupa* which are of *Manasa* (mental) in nature. *Arati* (restlessness), *Hitopadeshesu Akshanti* (getting irritated after hearing the words from the elders) are the examples of *Manasa Purvarupa*.

c. ***Sharira Manasa Purvarupa***: This set of *Purvarupa* are having both *Sharira* (physical) and *Manasa* (mental) natures. *Priti Amlapatushaneshu* (liking towards sour, salt and pungent tastes), *Svadushu Bhakshyeshu Dvesha* (aversion towards the substances having sweet taste) are the examples of *Sharira* and *Manasa Purvarupa*.

Chapter Resources

पूर्वरूपं नाम येन भाविव्याधिविशेषो विज्ञायते न तु दोषविशेषः।

तद् ध्युत्पत्स्यमानस्य व्याधेरल्पत्वादव्यक्तं रूपम्॥8॥

A.S.Ni. – 1/8

1. **'भाविव्याधिबोधकमेव लिङ्गं पूर्वरूपं'**
   Madhu, Ma.Ni. – 1/6
2. **प्राग्रूपं येन लक्ष्यते॥5॥**
3. **उत्पित्सुरामयो दोषविशेषेणानधिष्ठितः।**
   लिङ्गमव्यक्तमल्पत्वाह्याधीनां तद्यथायथम्॥6॥
   Ma.Ni. – 1/6
4. **"स्थान- संश्रयिणः कुद्धा भाविव्याधिप्रबोधकम्।**
   दोषाः कुर्वन्ति यल्लिङ्गं पूर्वरूपं तदुच्यते"।
   Madhu, Ma.Ni. – 1/6
5. **पूर्वरूपं प्रागुत्पत्ति लक्षणं व्याधेः॥8॥**
   Ca.Ni. – 1/8
6. **"पूर्वरूपं नाम येन भाविव्याधिविशेषो लक्ष्यते न तु दोषविशेषः"** Parashara, Madhu, Ma.Ni. – 1/6
7. **अव्यक्तं लक्षणं तेषां पूर्वरूपमिति स्मृतम्॥19॥**
   Ca.Ci. – 28/19 and Ca.Ci. – 11/12
8. **अव्यक्तलिङ्गं रूपं पूर्वरूपं,** Cakra, Ca.Ni. – 1/8
9. **तत्र पूर्वरूपगतेषु चतुर्थः क्रियाकाल॥33॥**
   Su.Su. – 21/33
10. **तच्च प्राग्रूप त्रिधा दृश्यते, किञ्चिच्छारीर किञ्चिन्मानस किञ्चिच्छारीरमानस च।**
    तत्र शारीर यथा-ज्वरस्यालस्यास्यवैरस्यगात्र-गौरवजृम्भासास्राकुलाक्षिते-त्येवंप्रायम्।
    मानस च – अरतिर्हितोपदेशेष्वक्षान्तिरित्येवप्रायम्।
    किञ्चिच्छारीरमानस यथा-"प्रीतिरम्लपटूषणे।
    द्वेष स्वादुषु भक्ष्येषु" (हृ.नि.अ. 218) इत्येवप्रायम्, शारीरमानसदोषजनितत्वात्।
    A.Hr.Ni. – 1/4, Arunadatta commentary

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya, Madhava Nidana excerpts

Key points of the chapter

⇨ "स्थान- संश्रयिणः कुद्धा भाविव्याधिप्रबोधकम्। दोषाः कुर्वन्ति यल्लिङ्गं पूर्वरूपं तदुच्यते"। Madhu, Ma.Ni.– 1/6 Purvarupa is the clinical feature observed prior to the manifestation of the disease. It is manifesting during 4th stage of Kriyakala i.e. Sthanasamshrayavastha. This helps in predicting the forthcoming disease.

⇨ **2 types of Purvarupa** are mentioned – Samanya (common) and Vishishta or Vishesha (specific). Samanya Purvarupa is manifested prior to the manifestation of the disease. Vishesha Purvarupa is helpful in predicting the probable involvement of Dosha during the manifestion of the disease in future. In Samanya Purvarupa, one cannot able to identify the Dosha dominance in Purvarupa stage.

⇨ **3 types** – Sharira (physical) such as Jvara (raised body temperature), Manasika (mental) such as Arati (restlessness) and Sharira-Manasa (psychosomatic) such as liking towards the consumption of sour and salt substances as per Arunadatta commentary of Ashtanga Hridaya.

Probable questions may be asked in the examination

Long essays

⇨ Describe Purvarupa in detail by giving suitable examples

⇨ Describe the various definitions of Purvarupa, explain the synonyms and types

⇨ Define Purvarupa and Rupa with example. Classify them. What is Upashaya and Anupashaya? Mention the role of Upashaya and Anupashaya in diagnosis of a disease. Define Samprapti.

Short essays

⇨ Describe Purvarupa Utpatti Kriya

⇨ Write about Purvarupa in detail

⇨ Purvarupa

⇨ Explain Purvarupa

Short answers

⇨ Purvarupa

⇨ Enumerate the types of Purvarupa

⇨ Classify Purvarupa with examples

⇨ Synonyms of Purvarupa

⇨ Bhavishya Linga

⇨ Purvarupa Bheda

⇨ Purah Sara

⇨ Vishesha/ Vishishta Purvarupa

⇨ Pratiniyata Purvarupa

MCQs

1. Purvarupa is manifested in which stage of Kriyakala?
   a. Sanchaya;
   b. Prakopa;
   c. Prasara;
   d. Sthanasamshraya
   Answer -(d)
2. **Sharira, Manasa and Sharira Manasa Purvarupa are the contribution of**
   a. Hemadri;
   b. Chakrapani Datta;
   c. Dalhana;
   d. Arunadatta
   Answer -(d)
3. **Dosha dominance in the Purvarupa stage is possible in case of**
   a. Sharirika Purvarupa;
   b. Manasika Purvarupa;
   c. Vishesha Purvarupa;
   d. Samanya Purvarupa
   Answer -(c)
4. **Which of the following is not the synonym of Purvarupa?**
   a. Purah Sara;
   b. Pragrupa;
   c. Nishpatti;
   d. Prak Chihna
   Answer -(c)
5. **Purvarupa is seen in**
   a. 1st stage of Kriyakala;
   b. 2nd stage of Kriyakala;
   c. 3rd stage of Kriyakala;
   d. 4th stage of Kriyakala
   Answer -(c)

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Rupa

5

Learning objectives

- ⇨ To know the various definitions of Rupa mentioned in different Ayurvedic literatures
- ⇨ To know the meaning of Rupa
- ⇨ To know the different synonyms mentioned in the texts
- ⇨ To know the meaning of Pratyatma Lakshana
- ⇨ To know the relevance of Rupa in current era

Definition of Rupa

उत्पन्नव्याधिबोधकमेव लिङ्गं रूपं

Madhu, Ma.Ni. – 1/7

तथाविधदोषदूष्यसंमूर्च्छनाविशेषो ज्वरादि-रूपो व्याधिः,
तत्कार्याश्चारुच्यादयः।

Madhu, Ma.Ni. – 1/7

प्रादुर्भूतलक्षणं पुनर्लिङ्गम्। Ca.Ni. – 1/9

उत्पन्नव्याधेः स्वरूपं Cakra, Ca.Ni. – 1/9

स्पष्टं पुना रूपम्। A.S.Ni. – 1/9

Definitions of Rupa

- ⇨ *Rupa* is completely manifested symptom of any disease. It may be either fully developed pre monitory symptom or symptom different from pre monitory symptom. This develops when there is strong *Dosha Dushya Sammurchana*. *Dosha Dushya Sammurchana* becomes stronger when *Nidana* (causative factor), *Dosha* and *Dushya* are having conducive environment for the manifestation of the disease. For example, if *Kapha Prakriti* individual consumes 100 ml of *Dadhi* consecutively for a period of 3 days, he may likely to develop more serious *Kaphaja Vikara*. If *Vataja Prakriti* individual consumes 100 ml of *Dadhi* for a period of 3 days, he may likely to have a milder form of *Kaphaja Vikara*.
- ⇨ Among *Shad Kriyakala*, *Rupa* develops during 5th stage of *Kriyakala* or *Vyaktavastha*. It gives the knowledge of the disease a patient is suffering from at that particular time. The chronological order of clinical presentation gives the knowledge regarding the involvement of *Dosha*, *Dushya*, *Srotas*, *Srotodushti* and its *Prakara*, *Udbhava Sthana*, *Sanchara Sthana*, *Vyakta Sthana* and *Sadhyasadhyata* of any illness.
- ⇨ *Udara Utsedha* is the *Rupa* of *Udara Roga*. *Prabhuta* and *Avila Mutrata* is the *Rupa* of *Prameha*. Difficulty in passing the urine is the *Rupa* of *Mutrakricchra*. *Atidrava Malapravritti* is the *Rupa* of *Atisara*. Frequent passage of either constipated (*Baddha Varcha*) or loose stools (*Drava Varcha*) for quite a long time and the duration of the illness is in terms of years is the *Rupa* of *Grahani*. *Deha* and *Manas Santapa* are the *Rupa* of *Jvara*.

Synonyms of Rupa

तदेव व्यक्ततां यातं रूपमित्यभिधीयते।
संस्थानं व्यञ्जनं लिङ्गं लक्षणं चिह्नमाकृतिः॥7॥

Ma.Ni. – 1/7

Synonyms of *Rupa*: (a) *Samsthana*, (b) *Vyanjana*, (c) *Linga*, *Lakshana*, *Chihna*, *Akriti* are the synonyms of *Rupa*.

Description of symptoms and signs

- ⇨ No types are mentioned in the context of *Rupa*. As per western medicine, clinical features are of two categories.
- ⇨ First set of clinical features are explained by the ill individuals. These clinical features cannot be identified by the clinicians. Such clinical features are known as symptoms and the clinical features identified by the clinicians, even by patients in some of the occasions are known as signs.
- ⇨ The examples are *Sula* (pain), *Mutrakricchra* (difficulty in micturition), *Aruchi* (tastelessness) etc. are considered as symptoms. The examples are *Murcha* (altered state of consciousness) due to *Hridroga* (heart disease), *Divabali* (worsening of the symptoms) in case of *Vataja Shotha*, *Antrakujana* (gurgling sound in the abdomen in case of *Udavarta*) etc considered as signs.

Determination of Pratyatma Lakshana

The word *Pratyatma Lakshana* refers to cardinal feature or main diagnostic feature. The diagnosis of any disease cannot be made in the absence of *Pratyatma Lakshana*. Several criteria are followed in the prediction of *Pratyatma Lakshana* in the patient. Those criteria are as follow:

- ⇨ **Most severe symptom–** presence of *Udara Shula* in the patient of *Shula*
- ⇨ **Most persistent symptom–** presence of sour eructations in the patient of *Amlapitta*
- ⇨ **Most chronic symptom–** presence of loss of strength of *Pakshaghata*
- ⇨ **Widely distributed symptom–** presence of scaling in the patient of *Ekakushtha*
- ⇨ **Symptom of diagnostic significance–** presence of yellowish white discolouration in the patient of Pandu; presence of dark yellowish discolouration in the patient of *Kamala*

Importance of Rupa and its relevance in current era

- ⇨ Gives the information about the type of vitiation of *Sharirika* or *Manasika Dosha*. For example, if the person is presented with raise in body temperature associated with yellowish coloured sputum indicates the involvement of *Sharirika Dosha* namely, *Pitta Dosha*. If the person is showing disinterest in all his activities and prefers sitting in one place only, this shows the involvement of *Manasika Dosha*, namely, *Tamo Dosha*
- ⇨ **Information of *Rupa* indicates the probable site of pathology:** Information about the *Rupa* will be helpful in determining the probable site of disease.
  - ☐ For example, if the 20 years old male patient is presented with cough with sputum, this may suggest the probable site of the involvement is *Pranavaha Srotas*.
  - ☐ If the 31 years old patient is presented with pain in epigastric region associated with vomiting for the past 4 days is suggestive of the involvement of *Annavaha Srotas*.
  - ☐ If 40 years old male patient is presented increased frequency of liquid stools associated with pain in lower abdomen from past 10 days is suggestive of the involvement of *Purishavaha Srotas*.
  - ☐ 27 years old female patient is presented with vomiting from past 2 days followed by increased frequency of loose stools associated with non radiating pricking type of pain in umbilical region from past 1 and ½ days is suggestive of the involvement of *Annavaha* and *Purishavaha Srotas*.
- ⇨ *Vyadhi Svarupa Jnana*: Actual knowledge of the disease process can be identified.
  - ☐ For example, if the 30 years old individual is presented with itching with skin lesions all over the body

for 3 to 4 years suggests *Chirakaritva* (chronicity) of the disease. Depending on the site of the disease, duration of the disease and nature of the disease, diagnosis of *Kushtha* is made.

- ☐ 17 years old male patient is presented with pain in the umbilical region for past 2 days followed by increased frequency of loose stools for past 1 and ½ days, then based on the nature of the disease, diagnosis of *Atisara* is made
- ☐ 23 years old female patient is presented with dry cough for past 7 days, followed by whitish sputum for past 5 days, followed by raised body temperature for past 4 days, associated with yellowish sputum for past 4 days, the diagnosis of *Pittaja Kasa* can be made as cough is considered to be the most persistent symptom.

⇨ ***Sadhyasadhyata* of *Vyadhi* in diseased individuals:** Prognosis of the disease can be predicted based on dominance of *Dosha*, involvement of *Dushya*, duration of occurrence of symptom, distribution of the symptom, involvement of other related *Srotas*.

- ☐ 18 years old female patient is presented with pain in lower abdomen for past 3 days, associated with increased frequency of liquid stools upto 20 times for past 2 days followed by fatigue for past 1 day, we can predict the vitiation of *Vata Dosha*, involvement of *Purisha*, *Rasa*. Thus, involvement of *Purishavaha*, *Rasavaha Srotas* will be predicted. Depending upon the nature and chronology and rapidity of the development of the symptoms, this is considered to be *Krichrasadhya* (curable with difficulty).
- ☐ 62 years old male patient is presented with itching developed gradually with dry skin lesions for the past 5 years. Based on the duration of the illness, this disease is considered as *Asadhya* (incurable) in nature.

⇨ Information of *Rupa* also helpful in deciding the line of management. Proper knowledge of the *Rupa* will be helpful in predicting the *Vyadhyavastha* in a particular individual.

- ☐ 21 years old male patient is presented with pain in lower abdomen for the past 2 days followed by increased frequency of liquid stools upto 10 times. This clinical history is suggestive of the *Saamavastha* of the disease process. *Langhana*, *Dipana* and *Pachana* line of treatment is adopted in *Saama* stage of the disease.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya, Madhava Nidana excerpts

Key points of the chapter

⇨ Rupa is completely manifested symptom of any disease. This starts to manifest when there is commencement of amalgamation of Dosha and Dushya. It may be either continuation of Purvarupa (premonitory symptom) or symptom different from Purvarupa. Rupa starts to manifest in 5th stage of Kriyakala or Vyakta Avastha.

⇨ Samsthana, Vyanjana, Linga, Lakshana, Chihna and Akriti are the synonyms of Rupa.

⇨ No separate type of Rupa is being mentioned in Ayurvedic literatures.

⇨ Pratyatma Lakshana (cardinal symptom) is main diagnostic feature. This is decided based on most severe symptom or most persistent symptom or widely distributed symptom or symptom of diagnostic importance.

⇨ **Importance of Rupa lies in**

- ☐ Predicting the Sadhyasadhyata (prognosis) of the disease
- ☐ Exact nature of disease
- ☐ Predicting the probable site of the pathology

Probable questions may be asked in the examination

Long essays

⇨ Describe various definitions of Rupa, explain the significance of Rupa in current clinical practice

⇨ Define Purvarupa and Rupa with example. Classify them. What is Upashaya and Anupashaya? Mention the role of Upashaya and Anupashaya in diagnosis of a disease. Define Samprapti.

⇨ Write the importance of Nidana Panchaka and explain definition, types with example of Rupa

Short essays

⇨ Define Rupa and explain the importance of Rupa

⇨ Differentiate between Vyadhi and Lakshana

⇨ Write about Pratyatma Lakshana

Short answers

⇨ Write the difference between Rupa and Roga

⇨ Classify Rupa with examples

⇨ Rupa

⇨ Synonyms of Rupa

⇨ Synonyms of Lakshana

⇨ Pratyatma Lakshana

⇨ Distinguish between Vyadhi and Lakshana

MCQs

1. **Which of the synonym of Rupa?**
   a. Lakshana;
   b. Chihna;
   c. Vyanjana;
   d. All of the above
   Answer -(d)
2. **Which of the following is not the synonym of Rupa?**
   a. Asatmya;
   b. Samutthana;
   c. Nishpatti;
   d. All of the above
   Answer -(d)
3. **Rupa will be observed in ……………. stage of Kriyakala.**
   a. 3rd;
   b. 4th;
   c. 5th;
   d. 6th
   Answer -(c)
4. **Udara Usedha is the Lakshana will be observed in the patients of**
   a. Shotha;
   b. Udara;
   c. Gulma;
   d. Arbuda
   Answer -(b)
5. **5th stage of Kriyakala is also termed as**
   a. Sthanasamshraya;
   b. Bheda;
   c. Vyakta;
   d. Prasara
   Answer -(c)

***

6

Upashaya

Learning objectives

- ⇨ To know the meaning of Upashaya and Anupashaya
- ⇨ To know the types of Upashaya and their application
- ⇨ To clinically apply the concept of Upashaya and Anupashaya
- ⇨ To make the distinction between Upashaya and Chikitsa

उपशयः पुनर्हेतुव्याधिविपरीतानां विपरीतार्थकारिणां
चौषधाहारविहाराणामुपयोगः सुखानुबन्धः॥1 0॥

Cha. Ni. – 1/10

हेतुव्याधिविपर्यस्तविपर्यस्तार्थकारिणाम्।
औषधान्नविहाराणामुपयोगं सुखावहम्॥8॥
विद्यादुपशयं व्याधेः स हि सात्म्यमिति स्मृतः।
विपरीतोऽनुपशयो व्याध्यसात्म्याभिसंज्ञितः॥9॥

Ma.Ni. 1/8-9

'औषधादिजनितः सुखानुबन्ध उपशयः।,

Ma.Ni. 1/8-9, Madhu

उपशयस्तु चिकित्सा

Cha. Ni. 1/9; Chakra

Upashaya is one of the modes of *Roga Pariksha.* This is useful where the clinician gets confused among the diseases which show similar clinical features. Let us take an example. 50 years old individual comes to the clinician with the history of pain in the knee joint for long duration. The probable diagnosis in such occasion comes between *Amavata* and *Sandhivata.* To distinguish between the two, one has to take oil for application over the joint. After application of the oil on knee joint, if the joint pain improves, then one has to make the diagnosis of *Sandhivata* and if worsens, one has to make the diagnosis of *Amavata, Saama* stage in particular.

The reason for the worsening of the pain in *Amavata,* is the presence of *Ama* in the joints. Application of the oil will worsen the status of *Ama* in the *Sandhi* and increases *Snigdhatva* in the area and thereby worsens the pain. Whereas in *Sandhivata,* there will be increase of *Rukshatva* in the body. As oil application increases the *Snigdhatva* and pacifies *Rukshatva* in the joints will help in the improvement of the symptom. This is responsible for the relief of the pain in *Sandhivata.*

Judicious use of *Aushadha* (medicine), *Ahara* (food substance) and *Vihara* (daily practices) which will be responsible for the improvement or worsening in the suffering of an individual is coming under the concept of *Upashaya.* This information will be helpful in

- ⇨ To identify the actual cause of the disease
- ⇨ Identifying the disease an individual is suffering from
- ⇨ Probable line of treatment can be planned

Upashaya and Anupashaya

Upashaya is the method where in after giving certain medicine, food or following certain practices, the ailing individual will be getting relief from the suffering.

Where in the term *Anupashaya* refers to worsening of the symptoms on following medicine, food or daily practices. Let us take the example of *Vyayama* leading to the vitiation of *Vata* in the patient of *Sandhigata Vata. Vyayama* is a kind of *Vihara* (regimen) and vitiation of *Vata* is the outcome of this regimen. In this example, *Vyayama* is considered to be *Anupashaya* for the patient of *Sandhigata Vata.* In other words, the *Nidana* (etiological factor) responsible for the vitiation of *Dosha* is considered to be *Anupashaya.*

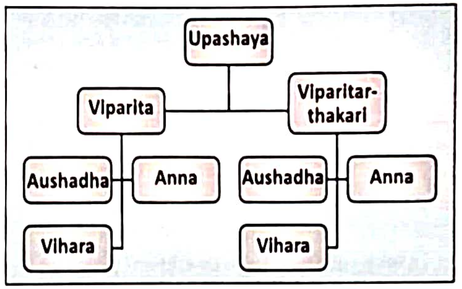
Synonyms

Satmya for **Upashaya; Asatmya** for **Anupashaya**

Types:

Based on the nature of *Upashaya,* it is of 18 types. While describing *Upashaya,* two terms are used: *Viparita* and *Viparitarthakari.* Each are again divided on the basis of *Hetu, Vyadhi* and *Ubhaya Viparita* and *Viparitarthkari.* Further each are subdivided into *Aushadha* (medicine), Anna (food substance) and *Vihara* (daily practices).

For example, the term *Hetu Viparita* refers to the measures which are opposite to the cause of the manifestation of the disease. The term *Vyadhi Viparita* refers to the measures which are opposite to the disease itself. The term *Ubhaya Viparita* refers to the measures which are opposite to the cause of the disease as well as the disease itself.



Flowchart 6.1: Showing different types of Upashaya

While discussing about the *Upashaya,* the term *Hetu Viparitarthakari* is used. The word means the measures which are similar to the cause of the disease. *Vyadhi Viparitarthakari* means the measures similar to the disease itself. *Ubhaya Viparitarthakari* means the measures which are similar to the cause of the disease and disease itself.

Table 6.1: Aushadha, Ahara and Vihara in terms of different types of Upashaya

Type of Upashaya	Aushadha	Ahara	Vihara
Hetu Viparita	Use of Shunthi as medicine due to its Ushna guna in the patient of Vatakaphaja Jvara	Use of Rasaudana in the patient suffering from Shramanilaja Jvara	Jagarana (awakening at night time) in night time in the patient who has developed Kapha Prakopa having Divasvapna
Vyadhi Viparita	Use of Patha etc in the patient suffering from Atisara for the purpose of Stambhana	Use of Masura etc in the patient suffering from Atisara for the purpose of Stambhana	Administration of Pravahana as a line of treatment in the patient who is suffering from Udavarta
Ubhaya Viparita	The administration of Dashamula in the patient of Vataja Shotha having the action of Vatahara and Shothahara	The administration of Yavagu in the patient of Shita Pradhana Jvara having the action of Ushna and Jvaraghna	Making the patient to go for Ratrijagarana which has action opposite to Tandra and Ruksha Guna. This is opposite to the manifestation of Tandra which occurs due to Divasvapna and its quality of Snigdhatva
Hetu Viparitarth-akari	Administration of Ushna Upanaha which is Pittakara in the patient suffering from Pitta Pradhana Pachyamana Shopha	Consumption of Vidahi Anna in the patient suffering from Pitta Pradhana Pachyamana Shopha	Giving Santrasana line of treatment in the patient of Vataja Unmada

Type of Upashaya	Aushadha	Ahara	Vihara
Vyadhi Viparitarth-akari	Administration of Madanaphala etc for the purpose of Vamana in the patient suffering from Chardi	Administration of Kshira which is Virechanakari in the patient suffering from Atisara	Pravahana for the purpose of Vamana in the patient of Chardi who is fit for the treatment
Ubhaya Viparitarth-akari	Administration of Agurvadi Lepa in the patient suffering from Agni Dagdha	Administration of Madakaraka Madya in the patient suffering from Madyapanajanya Madatyaya	Prescribing Vyayama in the form of swimming (Jalapratarana) etc in the patient suffering from Mudhavata due to Vyayama

Utility of Upashaya in clinical practice

"गूढलिङ्गं व्याधिमुपशयानुपशयाभ्यां परीक्षेत"

Cha. Ni. 1/10, Chakra; Cha. Vi. – 4/-

- ⇨ To arrive at an accurate diagnosis of any disease, a specific group of symptoms and signs are necessary. For example, in the patient of *Atisara*, diagnosis of the disease requires the presenting complaint of liquid or semisolid stools in increased frequency.
- ⇨ Similarly, when the patient is presented with malaise associated with mild fever, anorexia for more than 20 days, the diagnosis of *Jirna Jvara* and *Rajayakshma* can be made. But, as the previous history of fever and enlargement of spleen in *Jirna Jvara*; presence of *Pratishyaya, Karshya* in *Rajayakshma* may be absent in the initial stages. In such situation, *Ghritapana* is indicated as a diagnostic measure. If the situation improves, then the diagnosis of *Jirna Jvara* is confirmed and if the condition worsens, then the diagnosis of *Rajayakshma* is made.
- ⇨ Let us take another example of joint pain in differentiating the *Amavata* and *Sandhivata*. Warm oil is used in such occasion. If there is worsening of the pain on application of warm oil confirms the diagnosis of *Amavata* and if improvement in the symptom on application of warm oil confirms the diagnosis of *Sandhivata*. The reason to the worsening of pain in *Amavata* is *Snigdhatva* (unctuousness) which is present in the oil and the same quality is responsible for the manifestation of the disease in *Amavata*. In case of *Sandhivata*, the main quality responsible for the manifestation of the disease is *Ruksha* (dry). On application of warm oil, there will be subsidence of *Ruksha* (dry) and *Shita* (cold) which are the main the qualities of *Vata Dosha*.

Table 6.2: Difference between Upashaya and Chikitsa

Upashaya	Chikitsa
Diagnostic purpose	Therapeutic purpose
Role of Upashaya comes till the diagnosis	Role of Chikitsa continues even after diagnosis and Upashaya can also be continued as Chikitsa if shows improvement in the symptoms
Three types only – (a) Aushadha (b)Ahara (c)Vihara	Several types such as Shodhana and Shamana, Daiva Vyapashrya Chikitsa etc

Chapter Resources

1. Charaka Samhita, Ashtanga Sangraha, Ashtanga Hridaya, Madhava Nidana excerpts

Key points of the chapter

- ⇨ 'औषधादिजनितः सुखानुबन्ध उपशयः।, Ma.Ni. 1/8-9, Madhu; Upashaya is the method by which we will come to know which type of treatment is better for a suffering individual. It is also called as Chikitsa if we continue the same for the betterment of the individual.
- ⇨ हेतुव्याधिविपर्यस्तविपर्यस्तार्थकारिणाम्।
  औषधान्नविहाराणामुपयोगं सुखावहम्।।
  विद्यादुपशयं व्याधेः स हि सात्म्यमिति स्मृतः।
  विपरीतोऽनुपशयो व्याध्यसात्म्याभिसंज्ञितः।।

  Ma.Ni. 1/8-9

  Depending upon the nature of Upashaya adopted, it is of 18 types – Hetu, Vyadhi and Ubhaya Viparita and Hetu, Vyadhi and Ubhaya Viparitarthakari Upashaya.

  For each type of Upashaya, example is being given in the tabular form.
- ⇨ The best example of use of Upashaya is applying oil to the knee joint to differentiate Amavata and Sandhivata. If you apply the medicated oil in the patient of Amavata, it will worsen the pain and in the patient of Sandhivata, application of medicated oil will improve the situation.
- ⇨ "गूढलिङ्गं व्याधिमुपशयानुपशयाभ्यां परीक्षेत" Cha. Ni. 1/10, Chakra; Cha. Vi. – 4/8 The utility of Upashaya and Anupashaya lies in detecting diseases which are not showing identifiable symptoms.
- ⇨ Difference between Upashaya and Chiktsa is being tabulated at the end of the chapter.

Probable questions may be asked in the examination

Long essays

- ⇨ Describe Upashaya and Anupashaya in detail
- ⇨ Define Upashaya and explain in detail about the classification of Upashaya
- ⇨ Define Purvarupa and Rupa with example. Classify them. What is Upashaya and Anupashaya? Mention the role of Upashaya and Anupashaya in diagnosis of a disease. Define Samprapti.

Short essays

- ⇨ Upashaya and Anupashaya
- ⇨ Upashaya
- ⇨ Definition and classifications of Upashaya
- ⇨ Importance of Upashaya
- ⇨ Describe Anupashaya
- ⇨ Write the difference between Upashaya and Chikitsa
- ⇨ Write the types of Vyadhi Viparita Upashaya with examples
- ⇨ Goodha Lingam Vyadhim explain
- ⇨ Write Hetu Viparita Prakara type of Upashaya with examples
- ⇨ Explain Sutra – Gudhalingam Vyadhim Upashayanupashayabhyam Parikshet

Short answers

- ⇨ Upashaya and Anupashaya
- ⇨ Define Upashaya
- ⇨ Upashaya
- ⇨ Explain Upashaya and its types
- ⇨ Anupashaya
- ⇨ Discuss the utility of Upashaya and Anupashaya in diagnosing Vyadhi
- ⇨ Hetu Viparitarthakari Upashaya
- ⇨ Tadarthakari Upashaya
- ⇨ Types of Upashaya

MCQs

1. **Types of Upashaya mentioned in Ayurveda literatures is**

a. 6;
b. 12;
c. 18;
d. 24

Answer -(c)

2. **Upashaya is helpful in detecting**

a. Gudhalinga Vyadhi;
b. Vyaktalinga Vyadhi;
c. Vyadhi with Upadrava;
d. Vyadhi with Arishta Lakshana

Answer -(a)

3. **Which of the following is the synonym of Upashaya?**

a. Samsthana;
b. Satmya;
c. Samutthana;
d. Samvrita Asamvrita

Answer -(b)

4. **Use of Shunthi as medicine in the patient of Vatakaphaja Jvara is an example of ------- type of Upashaya.**

a. Hetu Vyadhi Viparita;
b. Vyadhi Viparita;
c. Hetu Viparitarthakari;
d. Hetu Viparita

Answer -(d)

5. **Textual example of Vyadhi Viparitharthakari Anna is**

a. Administration of Ushna Upanaha in the patient of Pittaja Pachyamana Shopha;
b. Consumption of Vidahi Anna in the patient of Pittaja Pachyamana Shopha;
c. Administration of Madakari Madya in the patient of Madyapanajanya Madatyaya;
d. Use of Rasoudana in the patient of Shramanilaja Jvara

Answer -(b)

***

Samprapti

7

Learning objectives

- ⇨ To know the concept of Samprapti
- ⇨ Pathological events occurring in Samprapti
- ⇨ To apply the types of Samprapti accordingly
- ⇨ To understand the concept of Samprapti in present days

1.1 Concept of Samprapti:

यथादुष्टेन दोषेण यथा चानुविसर्पता।
निर्वृत्तिरामयस्यासौ सम्प्राप्तिर्जातिरागतिः॥8॥

A.Hr.Ni. – 1/8

The word *Samprapti* gives the clinician the information about the disease from the onset of the symptoms till the complete manifestation of the disease. In other words, the type of *Dosha* vitiated in the body, the manner in which these vitiated *Doshas* are moving across the human body and the manner of the manifestation of the disease etc will be known if the clinician has the exact knowledge regarding *Samprapti* of a disease. In the coming pages, we are going to discuss these informations elaborately.

Proper understanding of *Samprapti* is made based on.

- ⇨ Type of *Dosha* vitiated in the body.
- ⇨ Manner of the movement of the *Dosha* across human body.
- ⇨ Manner of the manifestation of disease.

Type of Dosha vitiated in the body

- ⇨ Among the *Doshas*, which *Dosha* is/ are vitiated at the time of examination, the following factors needs to be answered.
  - ❑ *Sharirika* or *Manasika Dosha* vitiation.
  - ❑ Whether one or two or all the *Dosha* are involved in the disease process?
  - ❑ Is the *Dosha* in increased state or decreased state?
  - ❑ Is it *Anubandhya Dosha* (main *Dosha*) or *Anubandha Dosha* (associated *Dosha*) in the pathogenesis of the disease?
  - ❑ Is the *Dosha* in *Saama* state or *Nirama* state?
  - ❑ Is the *Dosha* in *Prakrita* or *Vaikrita* stage?
  - ❑ Is the *Dosha* in *Shakha*, *Marmasthi Sandhi* or *Koshtha*?
  - ❑ Whether the *Dosha* in *Chaya* state, *Prakopa* state, *Prasara* state, *Sthanasamshraya* state, *Vyakti* or *Bheda* state?
  - ❑ Whether one *Guna* or two *Guna* or more *Guna* or all *Gunas* of a particular is involved in the pathogenesis?
  - ❑ Diurnal variation regarding the worsening and remission of the symptoms and nature of the food intake.

Manner of the movement of the Dosha across human body

- ⇨ It is a well-known fact that *Dosha* will move all over the body in their normal conditions. Depending upon the vitiation of *Dosha*, virulence of the aetiological factors, degree of the exposure to the etiological factor, degree of involvement of *Dhatu* and *Mala*, involvement of *Srotas*, nature of *Srotodushti*, presence of *Ama*, there will be alteration in the movment of *Dosha*. Therefore, it becomes a prime duty of the clinician to predict the nature of the movement of *Dosha* in the body.

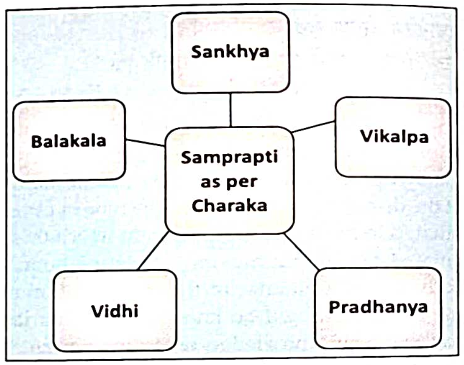
- As far as the movement of *Doshas* are concerned,
  - ☐ Whether the *Doshas* moving in one part of the body or whole body?
  - ☐ Whether the *Doshas* are situated in *Shakha*, *Marmasthisandhi* or *Koshtha*?
  - ☐ Whether one *Dosha* or two *Doshas* or all the *Doshas* are vitiated or not?
  - ☐ Whether movement of *Doshas* is in upward direction, downward direction or in oblique direction?
  - ☐ Whether the disease is having *Antarvegavastha* or *Bahirvegavastha*? Whether the disease is having *Uttana Avastha* or *Gambhira* stage? Whether the disease is showing *Dosha Pakavastha* or *Dhatu Pakavastha*?

The above said informations are helpful in deciding the actual stage of the disease at the time of inquiry by the clinician with the diseased individual. The following discussion is on elaborate description of the *Samprapti*, its types and its relevance in clinical diagnosis.

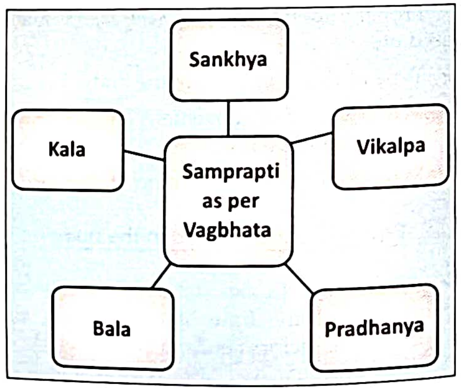
Manner of the manifestation of disease

- The person is exposed to the etiological factor.
- This is responsible for the accumulation of *Dosha* in the *Mahasrotas* where *Dosha Utpatti* takes place e.g, *Kapha Dosha Utpatti* in *Amashaya* etc. Which in turn is responsible for the production of *Ama* in the *Koshtha*.
- Accumulation of the *Ama* in the *Mahasrotas* or *Koshtha* further leads to the production of *Amavisha* in the *Koshtha*.
- This *Amavisha* has *Vyavayi* and *Vikasi Guna*. This will move all over the body and the person will have *Saama* stage in this situation.
- When there is *Khavaigunya* in any *Srotas* the circulating *Dosha* along with vitiated *Dosha* will mingle with surrounding *Dhatu* resulting in the conglomeration of *Dosha* and *Dushya*. This process is termed as *Dosha Dushya Sammurchana*. This is an important stage in the manifestation of the disease.
- The whole mechanism from the exposure to etiological factor till the complete manifestation of the disease is termed as *Samprapti*.

As per *Caraka*: 5 types: (a) *Sankhya*, (b) *Vikalpa*, (c) *Pradhanya*, (d) *Balakala* (e) *Vidhi Samprapti*

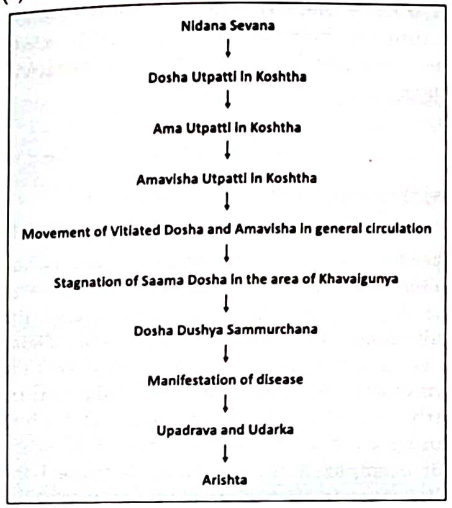


Flowchart 7.1: Types of Samprapti as per Charaka



Flowchart 7.2: Types of Samprapti as per Vagbhata

As per *Vagbhata*: 5 types: (a) *Sankhya* (b) *Vikalpa*, (c) *Pradhanya*, (d) *Bala*, (e) *Kala Samprapti*.


Nidana Sevana
Dosha Utpatti in Koshtha
Ama Utpatti in Koshtha
Amavisha Utpatti in Koshtha
Movement of Vitiated Dosha and Amavisha in general circulation
Stagnation of Saama Dosha in the area of Khavaigunya
Dosha Dushya Sammurchana
Manifestation of disease
Upadrava and Udarka
Arishta

Flowchart 7.3: Pathological events occrring in Samprapti

The following is a flowchart showing the events happening in the *Samprapti* from the time of exposure to etiological factor till the complete manifestation of the disease. The events of *Samprapti* can be even extended to manifestation of *Upadrava* and appearance of *Arishta Lakshana* in the body.

As far as the types of *Samprapti* concerned, *Charaka* has included *Bala* and *Kala Samprapti* together in one heading as *Balakala Samprapti* and mentioned a separate *Vidhi Samprapti*. Whereas *Vagbhata* explained *Bala* and *Kala Samprapti* separately and he did not explain *Vidhi Samprapti* and he mentioned *Vidhi Samprapti* under the heading of *Sankhya Samprapti*. Now we will explain the each type of *Samprapti* elaborately.

Sankhya Samprapti

यथाऽत्रैव वक्ष्यन्तेऽष्टौ ज्वरा इति॥9॥ A.Hr.Ni. – 1/9

Sankhya Samprapti: discusses about the number of diseases in total. As per *Charaka* in *Ashtoudariya Adhyaya*, there are 48 number of *Vikaras* are mentioned. Examples of *Sankhya Samprapti* are *Ashta Jvara*, *Pancha Gulma*, *Sapta Kushtha*, *Pancha Unmada* etc.

Vikalpa Samprapti

दोषाणां समवेतानां विकल्पोंऽशांशकल्पना।

A.Hr.Ni. – 1/10

सर्वैर्भावैस्त्रिभिर्वापि द्वाभ्यामेकेन वा पुनः॥
संसर्गे कुपितः क्रुद्धं दोषं दोषोऽनुधावति॥38॥

Su. Su. 21/38

Vikalpa Samprapti gives the information of increase or decrease of any specific *Amsha* or *Guna* (quality) of vitiated *Dosha*. For example, in case of *Vata Pradhana Vikara*, among the *Gunas* of *Vata*, which of the *Guna* is/ are increased whether *Laghu*, *Shita*, *Ruksha* or all the *Gunas* are increased? Similarly, the clinician has to consider in case of *Pitta* and *Kapha Dosha* also. *Sushruta* also states the same opinion. The clinician should identify the increased *Guna* or *Gunas* of vitiated *Dosha*.

- For example, if the clinician suspects the *Sita* of *Vata Dosha* is responsible for the disease manifestation, one has to plan the treatment by *Ushna* line of treatment, not by *Snigdha*, *Guru* etc which may be futile or of little use. If *Sita* and *Laghu Gunas* are responsible for the manifestation of the disease, then one has to plan the Ushna and Guru line of treatment for the accurate result.
- If a person consumes excess *Kashaya Rasa* substances and *Kalaya* excessively, it will be responsible for *Vata Prakopa* due to all qualities of *Vata Dosha*; in case of consumption of *Tanduliyaka*, it will be responsible for the vitiation of *Vata Dosha* due to its *Ruksha*, *Shita* and *Laghu* quality; in case of consumption of *Kandekshu*, there will be vitiation of *Vata Dosha* due to its *Ruksha* and *Shita* quality; in case of consumption of *Sidhu*, there will be vitiation of *Vata Dosha* due to its *Ruksha Guna* enhancement in the body.
- In case of *Pitta Dosha* vitiation, *Katu Rasa*

substances and *Madya* are consumed excessively, there will be vitiation of *Pitta Dosha* due to increase of all qualities; in case of excess consumption of *Hingu*, there will be vitiation of *Pitta* due to increase of *Katu, Tikshna* and *Ushna* qualities; in case of consumption of *Dipyaka*, there will be vitiation of *Pitta* due to the increase of *Tikshna* and *Ushna* qualities and in case of excess consumption of *Tila*, there will be vitiation of *Pitta* due to the increase of *Ushna Guna* (quality) in the body.

⇨ In case of *Kapha Dosha* vitiation, excess consumption of *Madhura Rasa* substances and *Mahishi Kshira*, there will be increase of *Kapha Dosha* due to the increase of all qualities of *Kapha Dosha*; due to the excess consumption of *Rajadana Phala*, there will be the vitiation of *Kapha Dosha* due to the increase of *Snigdha, Guru* and *Madhura* quality; excess consumption of *Kasheru*, there will be vitiation of *Shita* and *Guru* qualities; *Kapha Dosha* will be vitiated due to the increase of *Shita Guna* due to the excess consumption of *Kshiriphala*.

Pradhanya Samprapti

स्वातन्त्र्यपारतन्त्र्याभ्यांव्याधेः प्राधान्यमादिशेत्॥1 0॥

A.Hr.Ni. – 1/10

By the knowledge of this type of *Samprapti*, one can identify the dominance of the *Dosha* at a particular time in the diseased individuals. For example, in a patient if ten *Lakshana* are observed, among those *Lakshana*, if eight *Lakshana* are implying *Vata Dosha*, then it is diagnosed that the patient is suffering from *Vata Pradhana Vikara*. If two *Dosha* are vitiated, then the word Tara is used to indicate the *Pradhana Dosha* involved in the disease process; if all three *Dosha* are involved, then the word *'Tama'* is used to denote the dominant *Dosha* involved in the pathogenesis.

Bala Samprapti

हेत्वादिकात्स्न्यावयवैर्बलाबलविशेषणम्। A.Hr.Ni. – 1/11

Based on this concept, if *Hetu, Purvarupa* and *Rupa* are severe, then it implies that the person is suffering from severe disease. If the *Hetu, Purvarupa* and *Rupa* are mild, then these will suggest the mild disease affliction.

Kala Samprapti

न्नक्तंदिनर्तुभुक्ताशैर्व्याधिकाले यथामलम्॥1 1॥

A.Hr.Ni. 1/11

Based on this concept, the dominance of the *Dosha* is being decided by the Kala (time of the day, night, food intake and age of the individual). Dominance of the *Kapha Dosha* is being predicted if the person develops the symptoms soon after the food intake, during early morning and during early evening and during childhood below the age of 30 years. For example, if the person is developed the *Lakshana* soon after the food intake suggest the dominance of *Kapha Dosha* at that particular time.

Balakala Samprapti

बलकालविशेषः पुनर्व्याधीनामृत्वहोरात्राहारकाल-
विधिविनियतो भवति॥1 2॥ Ca.Ni. – 1/12

This concept is based on the strength of the season or time to predict the dominance of the *Dosha* in the disease manifestation. That means during *Varsha Ritu*, there will be dominance of *Vata Dosha*. There will be dominance of the *Pitta Dosha* during noon time and midnight. The description of the concept of *Balakala Samprapti* is similar to the description of *Kala Samprapti* as told by *Ashtanga Hrdaya*.

Vidhi Samprapti

विधिर्नाम-द्विविधा व्याधयो निजागन्तुभेदेन,त्रिविधा-
स्त्रिदोषभेदेन, चतुर्विधाः साध्यासाध्यमृदुदारुणभेदेन॥4॥

Ca.Ni. – 1/11-4

This concept is helpful in deciding the prognosis as well as the planning of the management of the disease in the patients. In other words, looking at the patients with different views to have the complete clinical presentation of the disease in the patient. For example, based on the criteria of the curability and incurability, diseases are classified into two types –

(a) *Sadhya* and

(b) *Asadhya Vikaras*. Based on the dominance of the *Dosha* involved, diseases are of 3 categories

(a) *Vataja*,

(b) *Pittaja*,

(c) *Kaphaja*. Diseases are classified into 4 varieties based on

(a) *Sadhya*

(b) *Krichrasadhya*

(c) *Yapya*

(d) *Pratyakhyeya*.

Relevance of Samprapti in current era

⇨ **Knowledge of *Vikalpa Samprapti*** helps in the analysis of *Guna* involvement in the pathogenesis of the disease.

❑ For example, when a person consumes *Kadali* (banana), there will be the increase of *Guru, Snigdha Guna* in the body and *Kadali* is a *Samana Pratyarabdha Dravya* (*Madhura Rasa, Guru, Snigdha Guna, Shita Virya* and *Madhura Vipaka*), it is responsible for the vitiation of *Kapha Dosha*. In this occasion, the degree of *Dosha* vitiation will be more. To pacify the vitiated *Kapha*, one has to plan the line of treatment which contains the drugs having *Katu, Tikta* and *Kashaya Rasa, Laghu, Ruksha* and *Katu Vipaka*.

❑ Let us take another example of *Ratrijagarana* (awakening at night time). *Ratrijagarana* is responsible for the increase of *Ruksha Guna* in the body resulting in the vitiation of *Vata Dosha*. To pacify the vitiated *Vata Dosha*, one should follow the *Divasvapna* without taking food. This is responsible for the increase of *Snigdha Guna* in the body. Further, it is told that the amount of sleep should be half the amount of time of *Ratrijagarana*.

⇨ Thus, *Vikalpa Samprapti* will help the clinician to plan the accurate line of treatment depending upon the *Amsha* (quality) of *Dosha* vitiation, thus helping the patient to attain speedy recovery.

❑ **Knowledge of *Pradhanya Samprapti*:**

❑ This type of *Samprapti* will be helpful in case of multiple *Dosha* involvement in the disease process.

❑ For example, if the person is presented with raised body temperature associated with cough with yellowish coloured sputum from the past 4 days indicates the involvement of *Pitta* and *Kapha Dosha* during the *Samprapti*. Here, *Pitta* is considered to be *Pradhana Dosha* and *Kapha* is considered to be *Apradhana Dosha*. The first line of the treatment is to pacify the *Pitta Dosha*.

❑ For example, 40 years old individual presented with pain in both the knee joints from past 6 months associated with joint swelling from past 3 months, it suggests that primary *Dosha* involved is *Vata Dosha* and *Kapha* is secondary *Dosha* in this occasion.

❑ **Knowledge of *Bala Samprapti*:**

❑ This type of *Samprapti* will be helpful in determining the dominance of *Rogabala* and *Rogibala*.

❑ Let us take the example of *Hetu*. If we see the three patients having the exposure to consumption of banana for different time intervals. One person is consuming two bananas for 3 days; second person is consuming 4 bananas for a period of 7 days; third individual is consuming 10 bananas a day for period of 15 days. In this example, exposure to the etiological factor is mild and for short duration in the first individual who consumes 2 bananas a day. In this individual, vitiation of

Kapha Dosha will be mild; likewise, the second individual will be having moderate vitiation of *Kapha Dosha* and third individual will be having more degree of vitiation of *Kapha Dosha.*

- Similar examples can be quoted in the context of *Purvarupa* and *Rupa* too. For example, there will be more vitiation of *Dosha* in the generalised symptom and less vitiation of *Dosha* in case of localised symptom.
- **Knowledge of *Kala Samprapti*:**
- This is helpful in determining the dominance of *Dosha* in the body in relation to time of the severity of the symptom
- For example, if the 34 years old individual develops headache on the exposure to sunlight at around 11 am refers to the dominance of the *Pitta Dosha* in the appearance of the symptom. Here, age also is another important factor in support of *Pitta Dosha*. In other words to say, the patient require more potent medicine to combat the symptom of *Pitta Dosha* in terms of age as well as diurnal variation. Suppose, if the above person belongs to *Pitta Prakriti*, then it is an additional factor to be considered in the management of the patient.
- **Knowledge of *Vidhi Samprapti*:**
- This is helpful in determining the actual stage of the disease, thereby useful in planning the appropriate line of treatment
- For example, 60 years old male patient presented with the pain in right knee joint from past 10 years associated with joint swelling and presence of crepitus on palpation making him difficult to walk refers to the disease is *Daruna* in nature based on duration of the symptoms, severity of the symptom and his compromise in routine activities. In this example, there is involvement of *Vata* and *Kapha Dosha* in the pathogenesis.
- In another example, 45 years old male patient presented with the pain in left knee joint from past 1 year not associated with joint swelling and crepitus on palpation and person can walk with little difficulty refers to the disease is *Mridu* in nature based on duration, severity and less compromise in his routine activities. In this example, there is involvement of *Vata* and *Kapha Dosha* in the pathogenesis.

Samprapti Ghataka

The term *Samprapti Ghataka* comprises of two words, *Samprapti* and *Ghataka*. *Samprapti* is explained already in the context of *Samprapti*. *Ghataka* refers to the components of *Samprapti* which will be helpful in deciding the *Vyadhi Vinischaya* and assessing the *Sadhyasadhyata* and planning the line of treatment. The concept of *Samprapti Ghataka* can be applied to diseases mentioned in the treatises of *Ayurveda* as well as to the newly emerging diseases in the present days.

The factors considered in the context of Samprapti Ghataka are as follows:

1. ***Doshas* vitiated–** *Saririka* or *Manasika*, proportion of the *Dosha* vitiation
2. ***Doshyas* involved–** *Dhatu* and *Malas* involved in the disease manifestation
3. ***Srotas* affected** – by observing the different *Lakshana* told in the context of *Srotodushti Lakshana* and *Sroto Viddha Lakshana*
4. ***Srotodushti Prakara*–** assessed by observing different *Lakshana* told in the context of *Srotodushti Lakshana* and *Srotoviddha Lakshana*
5. ***Agni*** – status of *Agni*, *Vishama*, *Manda* or *Tikshna*?
6. ***Ama*** – presence or absence of *Lakshana* of *Ama*
7. ***Udbhava Sthana*** – not helpful in the diagnosis of the disease, helpful in deciding the plan of treatment
8. ***Sanchara Sthana*–** decided by the presence and absence of *Lakshana* which may suggest either localised or generalised presentation
9. ***Vyakta Sthana*–** decided by the presence of *Pratyatma Lakshana*
10. ***Rogamarga*–** involvement of either one or two or all the three *Rogamarga*
11. ***Sadhyasadhyata*–** assessing the curability or incurability of an illness by different criteria
12. ***Vyadhyavastha*–** the disease is *Ashukari* (illness of short duration or having sudden complications) or *Chirakari* (long standing illness)

1. ***Dosha*:** By definition, the word *'Dosha'* refers to the normal status which have the tendency to the causation of the disease when appropriate environment to the *Dosha* arises. This imbalance of the *Dosha* occurs inside the body due to either faulty diet or faulty regimen. The imbalance of the *Dosha* may be either increased state (*Vriddha* state) or decreased state (*Kshaya* state). The patient may be having certain set of *Lakshana*. The clinician has to assess the chronology of these *Lakshana*. All these *Lakshana* has to be assessed in terms of abnormal *Dosha* and chronology of the *Lakshana* also has to be analysed. Increased state of the *Dosha* is responsible for the manifestation of the disease whereas the decreased state of the *Dosha* is responsible for the increase of other *Dosha* which in turn is resulting in the manifestation of the disease. That is the reason, the clinician has to consider *Vriddha Dosha* only in the manifestation of the illness, not the *Kshina Dosha* as that will be responsible for the increase of other *Dosha*. For example, if the person is presented with vomiting (*Chardi*), increase of *Vata* and *Kapha Dosha* can be predicted. If the person is presented with the complaints of *Purisha Apravritti*, then increase of *Vata Dosha* is inferred.
2. ***Dushya*:** The word *'Dushya'* comprises of *Dhatu* and Mala. In diagnosis of any disease, the clinician has to identify both symptoms inferring the increase and decrease of *Dhatu* and *Mala*. First of all, try to list out all the symptoms a person is suffering from and relate all these *Lakshana* to abnormalities of *Dushya* – increased state and decreased state. Both the states will be helpful in diagnosing the disease.
3. ***Srotas* involved:** First of all, list out all the symptoms an individual suffers from, then correlate these *Lakshana* to *Sroto Dushti* and *Sroto Viddha Lakshana* as mentioned in the text. If you observe the *Lakshana* of a particular *Srotas*, or if you observe a abnormality of a particular *Srotas*, it suggests that the person is having the affliction of that particular *Srotas*. For example, if the person is presented with the complaints of *Atidravamala Pravritti*, one can infer the involvement of *Purishavaha Srotas*. If the person is presented with the complaints of discolouration of the skin associated with severe itching, one can infer the involvement of *Rasavaha*, *Raktavaha* and *Mamsavaha Srotas*. If the person is presented with the complaints of distended veins in the lower limbs, it suggests the disturbance of function of Raktavaha Srotas.
4. ***Srotodushti Prakara*:** Four types of *Srotodushti Prakara* are mentioned – *Atipravritti*, *Sanga*, *Siragranthi*, *Vimargagamana*. By analysing all the *Lakshana* in a patient, try to find out what type of *Srotodushti* has happened in that particular patient. For example, if the person is having either *Purisha Atipravritti* or *Mutra Atipravritti* etc suggest that the patient is having *Atipravritti* type of *Srotodushti*. If the person is having the presenting complaints of *Chardi*, it suggests that the patient is having *Sanga* and *Vimargagamana*. If the person is having the presenting complaints such as *Ayama* of *Sira* in the lower limbs, it suggest that the patient is having the *Siragranthi* type of

Srotodushti.

5. **Agni:** The assessment of Agni is very much important in diagnosis as well as the management of the illness. The assessment of *Agni* can be done by inquiring about time of food intake, amount of food intake, quality of the food intake, ingredients of the food intake, status of the *Manas* during the food intake etc. *Mandagni* (reduced digestive fire) is considered to be the root cause for all diseases due to intrinsic causes (*Nija Karana*). There will be impaired formation of *Ahara Rasa* and *Kitta* due to the poor digestive function. The ill formed *Rasa* is termed as *Ama*. This *Ama* will be accumulated in the *Mahasrotas*. Later there will be the formation of *Amavisha* which has the properties of *Vyavayi* and *Vikasi*. These qualities are responsible for the transport of the *Ama* throughout the body. If this *Ama* mixes with the *Dhatu* during the state of *Dosha Dushya Sammurchana*, there will the commencement of the disease in the body of the individual. Even after the commencement of *Dosha Dushya Sammurchana*, the measures are not taken for the reversal of the process, this may lead to the severe form of disease manifestation and lead to the manifestation of *Upadrava*.

6. ***Ama***: *Ama* is considered to be the biproduct of improper digestion of ingested food. As discussed earlier, this is formed in the *Mahasrotas* due to the poor digestive function of *Agni*. *Ama* may also occur at *Dhatu* level due to the poor function of *Dhatvagni*. The presence of *Ama* in the body can be identified by the presence of *Samanya Ama Lakshana* such as *Srotorodha*, *Balabhramsha*, *Gourava*, *Vatamudhata* etc *Lakshana*.

7. ***Udbhava Sthana***: The concept of *Udbhava* Sthana is not helpful in diagnosing the disease. Its significance is in giving appropriate line of treatment, particularly the *Shodhana* line of treatment. In literatures, *Pitta* and *Kapha Pradhana Vikara* are having *Amashaya* as the *Udbhava Sthana* and *Vata Pradhana Vikara* are having *Pakvashaya* as the *Udbhava Sthana*. This concept is applicable to *Nija Vikara* only. *Virechana* and *Vamana* is planned depending upon dominance of the *Dosha*, strength of the disease, strength of the patient in case of *Pitta* and *Kapha Pradhana Vikara* respectively. In case of *Vataja Vikara*, *Basti* is planned.

8. ***Sanchara Sthana***: The concept of *Sanchara Sthana* is to identify whether the increased *Dosha* is restricted one part of the body or half of the body or whole body. This is identified by observing the presence or absence of the *Lakshana*. For example, the presence of the *Jvara* indicates the *Sarva Sharira* as the *Sanchara Sthana*. The presence of skin discolouration with itching in right hand only may suggest the *Sanchara Sthana* is right upper limb.

9. **Vyakta Sthana**: The appearance of *Pratyatma Lakshana* (cardinal feature) of the disease determines the *Vyakta Sthana*. The diseased person will be having certain set of symptoms. The wise clinician has to analyse all these *Lakshana* and has to identify the cardinal features among them. The determination of *Pratyatma Lakshana* can be ascertained by several criteria. These criteria are

- ⇨ **Most severe symptom** – such as presence of *Udara Sula* in *Sula*, *Suchivat Vedana* in the body (pricking type of pain) in *Visuchika*
- ⇨ **Most chronic symptom** – such as abnormal bowel habits in *Grahani*,
- ⇨ **Most persisting symptoms** – such as presence of *Amlodgara* in *Amlapitta*
- ⇨ **Widely distributed symptom** – such as discolouration of skin with itching in *Kushtha*
- ⇨ Symptom of diagnostic importance – such as *Pandu Lakshana* in *Pandu*, gait of vulture in *Gridhrasi*

The site of *Pratyatma Lakshana* is considered to be *Vyakta Sthana*. For example, the presence of running nose, sneezing determines the *Vyakta Sthana* as *Nasa* (nose). The presence of *Atidravamala Pravritti* determines the *Vyakta Sthana* as *Guda* (anus), sometimes *Sarva Sharira* due to the development of *Rasakshaya*. The presence of Jvara suggests the *Vyakta Sthana* as *Sarva Sharira*.

10 ***Rogamarga***: The concept of *Rogamarga* will be helpful in deciding the *Sadhyasadhyata* of any illness, duration of the treatment required, nature of the required treatment etc can be decided. For example, the presence of *Atidravamala Pravritti* suggests the involvement of *Abhyantara Rogamarga*. The presence of *Jvara* indicates the involvement of *Bahya Rogamarga*. The presence of *Sandhivedana*, *Sotha* in the *Sandhi* will be suggestive of the involvement of *Madhyama Rogamarga*. The *Dosha* present in *Bahya Rogamarga* has to be brought to the *Koshtha* and later appropriate *Shodhana* therapy is planned to eliminate the vitiated *Dosha* through proper channels. In case of *Abhyantara Rogamarga* involvement, *Shodhana* can be planned without adopting *Purvakarma* procedure provided *Ama Lakshana* are not seen in the patient. If the *Dosha* are present in *Madhyama Rogamarga*, *Shodhana* therapy is difficult.

11. ***Sadhyasadhyata***: Assessment of *Sadhyasadhyata* of the illness is based on several criteria. Number of *Sharirika* and *Manasika Dosha Prakopa*, involvement of *Dushya* in the manifestation of the disease, involvement of single or multiple *Srotas*, duration of the illness, involvement of single or multiple *Rogamarga*, the presence or absence of *Upadrava* etc.

12. ***Vyadhyavastha***: The word *Vyadhyavastha* refers to the stage of the disease. It may be either fast progression such as *Atisara*, *Visuchika*, *Vataja Hridroga* or slow progression such as *Kushtha* or *Grahani* etc. Fast progression of the illness is termed as *Ashukari* and slow progression of the illness is termed as *Chirakari*. The assessment of *Ashukari* and *Chirakari* will be helpful in determining the duration of the treatment. The development of rapidly developing complications can be prevented, sometimes even death also.

Apart from *Ashukari* and *Chirakari* stage of the illness, there are several other criteria are discussed in the literatures of *Ayurveda*.

- ⇨ ***Sama* stage and *Nirama* stage**– helpful in management of the illness. In case of *Sama* stage, *Purvakarma* such as *Snehana* etc planned when the patient is attaining the *Nirama* stage. To mitigate the *Sama* stage in the body, *Dipana* and *Pachana* modality of treatment is planned.
- ⇨ ***Ama*, *Pachyamana* and *Pakva* stage**– helpful in management of the illness again.
- ⇨ ***Antarvega* and *Bahirvega* stage**– helpful in deciding the stage of fever the patient is suffering from and thereby appropriate line of treatment can be planned.
- ⇨ ***Uttana* and *Gambhira* stage**– helpful in deciding the *Dhatu* involved in the disease process, thereby the *Sadhyasadhyata* of the disease can be predicted.
- ⇨ ***Alpa*, *Madhya* and *Bahudoshavastha* stage**– this can be assessed based on the duration of the exposure to causative factor, number of symptoms present in the patient, local or generalised symptoms, duration of the illness, number of *Dosha* and *Dhatu* involved in the disease process etc.

Chapter Resources

1. Charaka Samhita, Ashtanga Sangraha, Ashtanga Hridaya, Madhava Nidana excerpts

Key points of the chapter

- ⇨ यथादुष्टेन दोषेण यथा चानुविसर्पता। निर्वृत्तिरामयस्यासौ सम्प्राप्तिर्जातिरागतिः ।। A.Hr.Ni. – 1/8 Samprapti provides the timeline of the disease process from its onset till the complete manifestation of the disease. In the assessment of Samprapti, we need to know the nature of Dosha involved, site of the body involved, Dushya involved in the disease manifestation etc in detail to plan the treatment appropriately.
- ⇨ 5 types of Samprapti are described by Charaka and Vagbhata. **Sankhya, Vidhi, Vikalpa, Pradhanya** and **Balakala** Samprapti are the types mentioned by Charaka and Vagbhata mentioned **Sankhya, Vikalpa, Pradhanya, Bala** and **Kala Samprapti**. Charaka has described Vidhi Samprapti separately and Balakala Samprapti added together, whereas Vagbhata has included Vidhi Samprapti in Sankhya Samprapti and Bala and Kala Samprapti were mentioned separately.
- ⇨ **Samprapti Ghataka** are the components of Samprapti which should be known in each and every patient before administering the treatment. Factors mentioned in Samprapti Ghataka are Dosha vitiated, Dushya involved, Srotas afflicted, type of Srotodushti, nature of Agni, nature of Ama, Udbhava Sthana, Sanchara Sthana and Vyakta Sthana of Lakshana, Rogamarga involved, Sadhyasadhyata of the disease, Vyadhyavastha should be analysed elaborately.

Probable questions may be asked in the examination

Long essays

- ⇨ Define Samprapti and write in detail Vikalpa Samprapti
- ⇨ Describe Samprapti in detail. Write down the importance of Nidana Panchaka in Roga-Rogi Pariksha
- ⇨ How Nidana Panchaka helps in Roga Pariksha, elaborate the types of Samprapti
- ⇨ Define Purvarupa and Rupa with example. Classify them. What is Upashaya and Anupashaya? Mention the role of Upashaya and Anupashaya in diagnosis of a disease. Define Samprapti.
- ⇨ Write in detail definition, types and importance of Samprapti

Short essays

- ⇨ Samprapti Ghataka
- ⇨ Explain Samprapti Ghatakas
- ⇨ Explain in detail classification of Samprapti
- ⇨ Samprapti Nirukti, Bheda and its significance
- ⇨ Vikalpa Samprapti
- ⇨ Explain about Pradhanya Samprapti

Short answers

- ⇨ Define Samprapti
- ⇨ Samprapti Ghataka
- ⇨ Write the types of Samprapti
- ⇨ Pradhanya Samprapti
- ⇨ Vidhi Samprapti
- ⇨ Bala Samprapti
- ⇨ Kala Samprapti
- ⇨ Vikalpa Samprapti
- ⇨ Agati
- ⇨ Samanya Samprapti
- ⇨ Jati and Agati
- ⇨ Write Vikalpa Samprapti

MCQs

1. **Vidhi Samprapti is the contribution of**
   a. Charaka;
   b. Sushruta;
   c. Vagbhata;

   d. None of the above
   Answer -(a)

2. **Types of Samprapti as per Madhava Nidana are**
   a. 4;
   b. 5;
   c. 6;
   d. 3
   Answer -(b)

3. **5 types of Gulma is an example of**
   a. Sankhya Samprapti;
   b. Vikalpa Samprapti;
   c. Pradhanya Samprapti;
   d. Vidhi Samprapti
   Answer -(a)

4. **Analysis of each Guna (quality) of Dosha is done with the help of**
   a. Pradhanya Samprapti;
   b. Vidhi Samprapti;
   c. Kala Samprapti;
   d. Vikalpa Samprapti
   Answer -(d)

5. **Huge swelling in the knee joint in a patient of 65 years indicates that the person is having Dosha in -------- Rogamarga.**
   a. Bahya;
   b. Abhyantara;
   c. Madhyama;
   d. None of the above
   Answer -(c)

***

8

Shat Kriyakala

Learning objectives

- ⇨ Meaning of Shat Kriyakala
- ⇨ What are Shat Kriyakala?
- ⇨ How to understand the fundamentals of Sanchayavastha and Dosha Utpatti?
- ⇨ What is the relation between Nidana Panchaka and Shat Kriyakala?
- ⇨ Relevance of Shat Kriyakala in the present era

Sushruta, one of the foremost authorities on *Ayurveda* describes precisely the sequence of events taking place during the evolution of a disease depicting six distinct stages of pathogenesis. They are termed as 'Shad *Kriyakala*'. During these six stages, there will be disequilibrium of *Dosha* in the form of increase happen which in turn move all over the body, gets mixed with the *Dhatu* forming the state of *Dosha Dushya Sammurchana* (amalgamation of *Dosha* and *Dushya*). This mechanism is responsible for the production of various clinical features. Various levels of abnormalities of *Dosha* (depending on the nature, extent and duration of exposure to aetiological factors), abnormal increase of different qualities in the body, weak functioning of *Dhatu* and *Mala* in the body and interaction between *Dosha* and *Dushya* (*Dhatu* and *Mala*) determine the severity of the disease manifestation. These are the six occasions to plan the appropriate management of any illness.

क्रियाकालः कर्मावसरः। Su.Su. – 21/19, Dalhana

The term '*Kriya*' refers to treatment or management and '*Kala*' refers to the time; together refers to the time of treatment.

The concept of *Kriyakala* presents an unique way of predicting the stages of progression of the disease from a reversible pre clinical stage to completely manifested disease associated with either major or minor complications of reversible or irreversible in nature. The *Kriyakala* helps the clinician to make early diagnosis of a disease so that appropriate treatment is planned at appropriate time to reverse the disease progress. As stated by *Sushruta* – if you plan the appropriate management in *Sanchaya* stage, the vitiated *Doshas* get pacified early and will not advance in to the next stage of *Kriyakala*.

संचयं च प्रकोपं च प्रसरं स्थानसंश्रयम्।।
व्यक्तिं भेदं च यो वेत्ति दोषाणां स भवेद्भिषक्।।3 6।।

Su.Su. – 21/36

Table 8.1: Six stages of Kriyakala

1.	Prathama Kriyakala	Sanchaya Avastha	Stage of accumulation
2.	Dvitiya Kriyakala	Prakopa Avastha	Stage of provocation
3.	Tritiya Kriyakala	Prasara Avastha	Stage of circulation
4.	Chaturtha Kriyakala	Sthanasamshraya Avastha	Stage of localisation
5.	Panchama Kriyakala	Vyakta Avastha	Stage of manifestation
6.	Shashtha Kriyakala	Bheda Avastha	Stage of complication

- ⇨ Each stage of *Kriyakala* shows distinct clinical features. Based on the involvement of *Dosha*, *Dushya*, these *Lakshana* categorised into two *Dosha Lakshana* and *Vyadhi Lakshana*.
- ⇨ The *Lakshana* observed in *Sanchaya*, *Prakopa* and *Prasara* stage are termed as *Dosha Lakshana*. In these stages, there will not be *Dosha Dushya Sammurchana* which is essential in the manifestation of disease. In this occasion, one has to plan the *Dosha Pratyanika Chikitsa*.
- ⇨ The *Lakshana* observed in *Sthana Samshraya*, *Vyakti* and *Bheda* stage are termed as *Vyadhi Lakshana*. In these stages, there will be involvement of *Dosha Dushya Sammurchana*. In this occasion, one has to plan the *Vyadhi Pratyanika Chikitsa*.

Sanchayavastha (1st stage of Kriyakala)

तत्र संहति रूपा वृद्धिः चयः।। सु.सू. - 33/3, डल्हण

चयो वृद्धिः स्वधाम्न्येव प्रद्वेषो वृद्धिहेतुषु।
विपरीत गुणेच्छा च।। अ.ह.सू. - 12/22

In this stage of *Kriyakala*, the *Doshas* will accumulate in their own sites in *Koshtha*. *Kapha* and *Pitta Sanchaya* takes place in *Amashaya* and *Vata Sanchaya* takes place in *Pakvashaya*. This accumulation is quantitative accumulation not qualitative increase.

Sanchaya Lakshana of Dosha

संचितानां खलु दोषाणां स्तब्धपूर्णकोष्ठता पीतावभासता मन्दोष्मता चाङ्गानां गौरवमालस्यं चयकारणविद्वेषश्चेति लिङ्गानि भवन्ति, तत्र प्रथमः क्रियाकालः।। सु. सू. 21/18

Table 8.2: Clinical features of Sanchyavastha of different Doshas

Vata	Stabdha Koshthata (Sluggish movements in alimentary canal)	Purnakoshthata (feeling of fullness in alimentary canal)	Chaya Karana Vidvesha (Aversion towards the etiological factors responsible for vitiation of Dosha)
Pitta	Pitavabhasata (Yellowish discolouration)	Mandoshmata (Either raised or reduced temperature)	
Kapha	Anganam gaurava (Heaviness of body parts)	Alasya (Laziness)	

(RH Singh) Actual pathognomonic *Sanchaya* of *Doshas* is triggered due to the presence of *Ama* because of *Mandagni Vyapara*. The *Ama* renders the body metabolically slow and sluggish along with varying degrees of blockade of the channels of the body. The presence of *Ama* due to its antigenic/ autotoxic properties also precipitates the production of many antibodies which again block the *Srotas*. This state of morbidity may be equated with contemporary concept of loss of membrane integrity and membrane pathology which is considered as the sheet anchor of the pathology of many diseases as conceived in modern medical sciences. The membrane biology is considered as the most vulnerable facet and integrity of the membrane structures at all levels including cell membranes and their pores or permeability (*Srotas*) dynamically functioning there, is the most important consideration in evolution of a disease. Thus, *Mandagni*, *Ama* and *Srotosanga* are the precipitating events for the *Sanchaya* of the *Doshas*.

Veteran *Ayurveda* scholar, Shiv Charan *Dhyani*, raised some questions regarding the *Sanchaya* stage.

- ⇨ ***Chaya* of *Dosha*** occur in its/ their own sites. Each *Dosha* is having 5 subtypes and locations. The question is whether *Chaya* of *Dosha* occur in all those locations or occur in *Koshtha* only? *Vata Dosha* in *Pakvashaya*, *Sakthi*, *Tvak* etc, *Pitta Dosha* in *Grahani*, *Sveda*, *Rudhira* etc and *Kapha Dosha* in *Ura Pradesha*, *Sandhi*, *Shiras* etc. The answer to the above query is *Chaya* occur in the *Koshthastha Sthana* of respective *Dosha* i.e. *Vata Dosha Pakvashaya*, *Pitta Dosha* in *Adho Amashaya* and *Kapha Dosha* in *Urdhwa Amashaya*. Because of *Mithya Ahara*, *Chaya* occurs in these sites, later there will be *Dushti* of subtypes of *Dosha*.
   - ☐ *Chayavasta* occurs in *Koshtha* only. The reason for this is there are two types of classification of diseases based on *Ashaya* as *Amashayasamuttha* and *Pakvashayasamuttha*. *Pitta* and *Kaphapradhana Vikara* are considered to be *Amashayasamuttha Vikara* and *Vata Pradhana Vikara* are considered to be

Pakvashayasamuttha Vikara. This type of classification is not helpful in diagnosis of a disease. This is helpful in planning the proper management of any illness.

- ☐ *Chayavastha* is considered to be 1st stage of *Kriyakala* among 6 stages. *Koshtha Shodhana* is the ideal management at this particular time.

⇨ The accumulation of anything implies obstruction in *Marga* (channel) /*Gati* (movement). It is a rule that *Chaya* should come after the consumption of aetiological factor which in turn is responsible for the manifestation of the diseases. The prime question is Who is responsible for the obstruction? When? How?

- ☐ *Ama* is responsible for the obstruction. The main function of *Ama* is *Srotorodha.* This *Ama* occurs because of *Agnimandya* which is the resultant of *Nidana Sevana.* In almost all the diseases, there are some factors responsible for *Agnimandya.* As per fundamental principles, *Mandagni* is considered to be the root cause for all *Nija Vikara.*

⇨ In case of *Chaya* of *Doshas* in 1st *Kriyakala,* whether *Chaya* of *Poshya Dosha* or *Poshaka Dosha* occurs?

- ☐ *Pachana* of *Ahara* occurs by *Poshya Doshas* and their nourishment is by *Ahara* only. *Poshya Kapha* is responsible for the initial digestion. *Madhuribhava* of *Ahara* occurs and simultaneously there will be production of *Poshaka* Kapha in *Amashaya.* Similarly there will be production of *Poshaka Pitta* and *Poshaka Vata* during Amlibhava and *Katubhava* of *Ahara Pachana* respectively.
- ☐ Because of *Nidana,* there will be *Agnimandya* which in turn leads to the manifestation of *Ama* in *Koshtha.* Presence of *Ama* in *Koshtha* results in obstruction of *Srotas* connected to *Koshtha.* This obstruction impairs the movement of *Ahara Rasa* and hampers the formation of *Dhatu.* This implies *Chaya* of *Poshaka Doshas* only, not *Poshya Doshas.*
- ☐ It is also possible that *Poshaka Dosha Chaya* in *Koshtha* and *Poshya Dosha* on the other side of the *Koshtha* i.e. *Chaya* of both *Poshya* and *Poshaka Dosha* occurs. In *Prasara* stage of *Kriyakala,* there will be mixing of the *Poshaka* and *Poshya Dosha.* In *Sthana Samshraya, Vyakti* and *Bheda* stage, the *Poshya* and *Poshaka Dosha* along with abnormal *Dhatu* are responsible for the manifestation of the disease.
- ☐ As *Poshaka Dosha Chaya* is a primary phenomenon in the manifestation of the disease, it is given prime importance when compared to *Poshya Dosha Chaya.*

⇨ *Chaya* of *Dosha* occurs as *Dosha* having all the qualities or a *Dosha* having a specific quality or qualities?

- ☐ *Doshas* are having different qualities with different diseases. For example, *Ushna Guna* of *Pitta* responsible for *Jvara, Ushna* and *Tikshna Gunas* are responsible for *Raktapitta, Sara Guna* is responsible for *Atisara* and *Drava Guna* is responsible for *Agnimandya.*
- ☐ *Doshas* will increase wholly or partially with one or two qualities. In majority of the diseases, there will be increase of specific quality. In that way, one can say that Chaya of a specific quality occurs, though after Avarodha, there will be *Chaya* of *Dosha* wholly with all the qualities. But for the purpose of simplicity one can say that there will be *Chaya* of a specific quality of *Dosha.*

⇨ It is accepted that *Ama* is responsible for obstruction in *Chayavastha.* There will not be any movement of *Dosha* until there is obstruction. How the obstruction of *Dosha* in *Chaya* stage and *Prakopa* stage is removed in *Prasara* stage of *Kriyakala?*

- ☐ The possible answer is in *Prakopa* stage, the *Ama* is transformed into *Amavisha.* *Amavisha* is having the qualities similar to *Visha* i.e. *Vyavayi* and *Vikasi Guna.* That is why, the *Amavisha* will move throughout the body in *Prasaravastha.*

⇨ There will be *Samprapti* for each disease manifestation. *Samprapti* begins from *Sanchaya* stage or 1st *Kriyakala.* The question arises is how *Chayavastha* occurs due to *Kshina Dosha* and how it is responsible for the manifestation of the disease?

- ☐ *Dosha Kshaya* is not directly responsible for the manifestation of the disease. *Dosha Kshaya* is responsible for the vitiation of some other *Sharirika Dosha* thereby indirectly responsible for the disease manifestation.

⇨ There is mentioning of *Achaya Prakopa* which is usually seen in *Agantuja Vikara.* The word *Achaya Prakopa* refers to *Alpachaya* or *Chaya Prakopa* in short time. In this stage, the clinician cannot identify the *Chaya* stage.

The significance of knowledge of this stage of *Kriyakala* is being highlighted at the end of the present chapter in the management of the disease.

Prakopavastha (2nd stage of Kriyakala)

कोपस्तून्मार्गगामिता॥ अ.हृ.सू. - 12/13

उन्मार्गगामिता स्वस्थानं त्यत्त्वा दोषस्य यत् पुनर्मार्गान्तरगमनम्, स कोप इत्युच्यते॥

अरुणदत्त, अ.हृ.सू. - 12/13

उन्मार्गगामिता स्वमार्गादन्येन मार्गेण गमनम् - कोप। तत्र यदा प्रथम स्थानिनमभिभूय अन्यस्थानव्याप्तिस्तदा स्वेषा लिङ्गानां रौक्ष्यादीनां दर्शनम्॥ हेमाद्रि,

अ.हृ.सू.. - 12/13

विलयनरूपा वृद्धिः प्रकोपः॥ सु.चि. - 33/3, डल्हण

In second stage of *Kriyakala* or *Prakopavastha* (Stage of provocation), the vitiated *Doshas* gets swollen in their own accumulated sites. *Vata Dosha* gets swollen in *Pakvashaya; Pitta Dosha* gets swollen in *Adho Amashaya* and *Kapha Dosha* gets swollen in *Urdhva Amashaya.*

Lakshana of 2nd stage of Kriyakala

तेषां प्रकोपात् कोष्ठतोदसंचरणाम्लिकापिपासापरिदाहान्नद्वेषहृदयोत्क्लेदाश्च जायन्ते तत्र द्वितीयः क्रियाकालः॥

सु.सू. - 21/27

Table 8.3: Clinical features of Prakopavastha of different Doshas

Vata Dosha	Koshtha Toda (Pricking type of pain in alimentary canal)	Sancharana (movement of Vata in alimentary canal)	
Pitta Dosha	Amlika (Sour belching)	Paridaha (Burning sensation all over the body)	(Pipasa (Thirst)
Kapha Dosha	Annadvesha (Dislike towards food intake)	Hridayotkleda (Nausea)	

⇨ No specific line of treatment is being explained for this stage of *Kriyakala* in *Susrhuta Samhita.*

Prasara Avastha – 3rd stage of Kriyakala

अत ऊर्ध्वं प्रसरं वक्ष्यामः तेषामेभिरातङ्क विशेषैः प्रकुपितानां पर्युषित किण्वोदक पिष्ट समवाय इवोद्रिक्तानां प्रसरो भवति तेषां वायुर्गतिमत्वात् प्रसरणहेतुः स्त्यपि अचैतन्ये। स हि रजोभूयिष्ठः, रजश्च प्रवर्तकं सर्वभावानाम्॥

सु.सू. - 21/28

यथा महान् उदकसंचयोऽतिवृद्धः सेतुमवदार्य अपरेण उदकेन व्यामिश्रः सर्वतः प्रधावति॥ सु.सू. 21/28

In third stage of *Kriyakala* or *Prasaravastha,* the provocated *Dosha* in their own sites, move all over the body. Spread of aggravated *Doshas* takes place like overflowing of mixture of yeast, water and flour kept in a vessel. *Vata* is responsible for this kind of the spread. This is the simile which illustrates the chemical change occurring during the *Prasara* stage. The second simile given is as a large accumulation of water further excessively increased breaks the barrier and mix with other pool of water runs in all directions. This simile illustrates the physical change occurring during the *Prasara* stage. Thus, excessively aggravated *Doshas* also spread sometimes alone or in various combinations.

कृत्स्नेऽर्धेऽवयवे वाऽऽपि यत्राङ्गे कुपितो भृशम्।
दोषो विकारं नभसि मेघवत्तत्र वर्षति॥ सु.सू. - 21/29

The aggravated Dosha spread in whole or half or part of the body, causes diseases in the area of stasis of aggravated Dosha just like cloud in the sky responsible for the rain in the area of appearance of cloud.

नात्यर्थं कुपितश्चापि लीनो मार्गेषु तिष्ठति।
निष्प्रत्यनीकः कालेन हेतुमासाद्य कुप्यति॥ सु.सू. - 21/30

If the *Dosha* are not potently vitiated or aggravated, it stays hidden or dormant in channels for a while and no treatment given then in due course of time, these dormant *Doshas* are getting aggravated if conducive environment favours the poorly aggravated *Doshas*.

In general, the Lakshana observed during this stage of Kriyakala are

एवं प्रकुपितानां प्रसरतां वायोर्विमार्गगमनमाटोपौ ओषचोषपरिदाहधूमायनानि पित्तस्य अरोचकाविपाकाङ्गसादाश्छर्दिश्चेति श्लेष्मणो लिङ्गानि भवन्ति॥
सु.सू. - 21/32

Depending upon the dominance of *Dosha*, 15 types of *Prasara* are mentioned in *Sushruta Samhita*.

Significance of knowledge of 3rd stage of Kriyakala

तत्र वायोः पित्तस्थानगतस्य पित्तवत् प्रतीकारः, पित्तस्य च कफस्थानगतस्य कफवत्, कफस्य च वातस्थानगतस्य वातवत्; एष क्रियाविभागः॥3 1॥ Su.Su. – 21/31

- ⇨ If the aggravated *Dosha* spread to the site of other *Dosha*, then the line of treatment should be given to the *Dosha* originally belonging to that site. For example, if aggravated *Vata Dosha* moves to the site of *Pitta*, the line of treatment should be to pacify *Pitta* and it should be considered to other aggravated *Dosha* moving to sites of other *Doshas*.
- ⇨ During the first three stages – *Sanchaya*, *Prakopa* and *Prasara*, one should follow the line of treatment related to the vitiated *Dosha* i.e. *Dosha Pratyanika Chiktsa*.

Table 8.3: Clinical features of Prasaravastha of different Doshas

Vata Dosha	Vimargagamana (Movement of Vata in abnormal direction)	Atopa (Gurgling sound in the abdomen)		
Pitta Dosha	Osha (Burning sensation in one part of the body)	Chosha (Squeezing type of pain)	Paridaha (Burning sensation all over the body)	Dhumayana (Feeling of smoke coming through mouth)
Kapha Dosha	Arochaka (Tastelessness)	Avipaka (Impaired digestion)	Angasada (Sluggish movements of the body parts)	Chardi (Vomiting)

Sthana Samshraya Avastha – 4th stage of Kriyakala

कुपितानां हि दोषाणां शरीरे परिधावताम्।
यत्र सङ्गः खवैगुण्यात् व्याधिस्तत्रोपजायते॥ सु.सू. - 24/19

Aggravated *Doshas* circulating all over the body localises on the place of *Khavaigunya* (dysfunction in the *Srotas*) resulting in the manifestation of *Vyadhi*.

अत्र ऊर्ध्वं स्थानसंश्रयं वक्ष्यामः।
एवं प्रकुपिताः तांस्तान् शरीरप्रदेशानागम्य तांस्तान् व्याधीन् जनयन्ति।
ते यदोदरसन्निवेशं कुर्वन्ति तदा गुल्म-विद्रध्युदराग्निसङ्गानाहविसूचिकातिसारप्रभृतीन जनयन्ति; बस्तिगताः प्रमेहाश्मरीमूत्राघातमूत्रदोषप्रभृतीन्; वृषणगता वृद्धीः; मेढ्रगता निरूद्धप्रकशोपदंशशूकदोषप्रभृतीन्; गुदगता भगन्दरार्शःप्रभृतीन्; ऊर्ध्वजत्रुगतास्तु ऊर्ध्वजान्;

त्वङ्मांसशोणितस्थाः क्षुद्ररोगान् कुष्ठानि विसर्पांश्च;
मेदोगत ग्रन्थ्यपच्यर्बुदगलगण्डालजीप्रभृतीन्;
अस्थिगता विद्रध्यनुशयीप्रभृतीन्; पादगताः
श्लीपदवातशोणितवातकण्टकप्रभृतीन्; सर्वाङ्गता
ज्वरसर्वाङ्गरोगप्रभृतीन्; तेषामेवमभिनिविष्टानां
पूर्वरूपप्रादुर्भावः; तत्प्रतिरोगं वक्ष्यामः।
तत्र पूर्वरूपगतेषु चतुर्थःक्रियाकालः॥3 3॥ Su.Su. – 21/33

In this stage, the vitiated *Dosha* circulating all over the body gets localised to one part of the body. This localisation happens due to the presence of *Khavaigunya* (abnormalcy in the channel). Due to *Khavaigunya*, there will be intermingling of vitiated *Dosha* and *Dhatu* present in that place. In this stage of *Kriyakala*, manifestation of *Purvarupa* occurs.

- ⇨ If the vitiated *Dosha* gets localised in *Udara* (abdomen) region, there will be manifestation of *Gulma*, *Vidradhi*, *Udara*, *Agnisanga* or *Agnimandya*, *Anaha*, *Visuchika*, *Atisara*, *Pravahika*, *Vilambika* etc
- ⇨ If the vitiated *Dosha* gets localised in *Basti* (urinary system) region, there will be manifestation of *Prameha*, *Ashmari*, *Mutraghata*, *Mutradosha* etc
- ⇨ If the vitiated *Dosha* gets localised in *Medhra* (penis) region, there will be manifestation of *Niruddha Prakasha*, *Upadamsha*, *Shukadosha* etc
- ⇨ If the vitiated *Dosha* gets localised in *Guda* (anus) region, there will be manifestation of *Bhagandara*, *Arsha* etc
- ⇨ If the vitiated *Dosha* gets localised in *Vrishana* (testicle) region, there will be manifestation of *Vriddhi*
- ⇨ If the vitiated *Dosha* gets localised in *Jatrurdhva* (head and neck) region, there will be manifestation of diseases pertaining to head and neck region
- ⇨ If the vitiated *Dosha* gets localised in *Tvak*, *Mamsa* and *Shonita*, there will be manifestation of *Kshudraroga*, *Kushtha*, *Visarpa*
- ⇨ If the vitiated *Dosha* gets localised in *Medo Dhatu*, there will be manifestation of *Granthi*, *Apachi*, *Arbuda*, *Galaganda*, *Alaji* etc
- ⇨ If the vitiated *Dosha* gets localised in *Asthi*, there will be manifestation of *Vidradhi*, *Anushayi* etc
- ⇨ If the vitiated *Dosha* gets localised in *Pada* (feet) region, there will be manifestation of *Shlipada*, *Vatashonita*, *Vatakantaka* etc
- ⇨ If the vitiated *Dosha* gets localised in *Sarvanga* (all over the body), there will be manifestation of *Jvara*, *Sarvangaroga* etc

Significance of 4th stage of Kriyakala

स्थानसंश्रयिणः क्रुद्धा भाविव्याधिप्रबोधकम्।
दोषा कुर्वन्ति यल्लिङ्गं पूर्वरूपं तदुच्यते॥ मा.नि. - 1/7, मधु

- ⇨ This stage will give a clue in determining the forthcoming disease, as *Purvarupa* (premonitory symptoms) appear in this stage.
- ⇨ In this stage, conglomeration of *Dosha* and *Dushya* starts to commence, thus disease manifestation begins.
- ⇨ From this stage onwards, we have start to give *Vyadhi Pratyanika Chikisa* in stead of *Dosha Pratyanika Chiktsa*. The treatment may be either *Mridu Samshodhana* (mild purificatory procedure)or *Samshamana Chikitsa* (palliative therapy).

Vyakta Avastha – 5th stage of Kriyakala

व्याधेः प्रव्यक्तं रूपं व्यक्तिः॥ सु.सू. - 21/34, डल्हण

Clear manifestation of the disease is seen in this stage along with clearly identifiable clinical features of the disease.

अत ऊर्ध्वे व्याधेर्दर्शनं वक्ष्यामः-शोफार्बुदग्रन्थिविद्रधिविसर्पप्रभृतीनां प्रव्यक्तलक्षणता ज्वरातिसारप्रभृतीनां च।
तत्र पञ्चमः क्रियाकालः॥3 4॥ Su.Su. – 21/34

- ⇨ In this stage, there will be further intermingling of vitiated *Dosha* and *Dhatu* in particular location.
- ⇨ There will be complete manifestation of symptoms such as *Shopha*, *Jvara*, *Granthi*, *Vidradhi*, *Visarpa*, *Arbuda*, *Atisara* etc
- ⇨ In this stage, the *Pratyatma Lakshana*

(cardinal feature) of the disease is observed. For example, *Sarana Lakshana* of *Atisara* (excess passage of liquid stools through anus)

- ⇨ In this stage of *Kriyakala*, *Vyadhi Pratyanika Chikitsa* (line of treatment opposite to the manifestation of the disease) is followed.

Significance of 5th stage of Kriyakala

- ⇨ The disease shows complete appearance of the symptoms or the symptoms will be severe.
- ⇨ *Dosha* dominance in the manifestation of the disease can be determined.
- ⇨ In this stage, one should give *Vyadhi Pratyanika Chikitsa*. As the degree of vitiation of *Dosha* is more, then ideal line of treatment is *Samshodhana* (purificatory therapy) line of treatment giving due consideration to the physical strength of the patient, digestive power of the patient, season in the patient is receiving treatment etc.

Bheda Avastha – 6th stage of Kriyakala

अत ऊर्ध्वमेतेषामवदीर्णानां व्रणभावमापन्नानां षष्ठः क्रियाकालः, ज्वरातिसारप्रभृतीनां च दीर्घकालानुबन्धः। तत्राप्रतिक्रियमाणेऽसाध्यतामुपयान्ति॥ सु.सू. - 21/35

The distinctive change that occurs to a disease after fully manifested stage can be called as *Bheda*. This is an indication of poor prognosis of the disease.

- ⇨ In this stage, there will be further intermixing of vitiated *Dosha* and *Dhatu* in the specified location.
- ⇨ The duration of the illness will be much prolonged.
- ⇨ During this stage, *Dosha* dominance in the pathogenesis of the disease can be predicted in *Jvara* (fever), *Atisara* (diarrhoea) etc.
- ⇨ In this stage, there will be manifestation of *Upadrava* (complications)
- ⇨ If proper treatment is not being adopted in this stage, the disease will reach the stage of incurability.

Significance of 6th stage of Kriyakala

- ⇨ In this stage, there will be appearance of *Upadrava* (mild or moderate or severe complications) or *Udarka* (sequel). The person may have chronicity of the disease.
- ⇨ In this stage, *Vyadhi Pratyanika Chikitsa* should be adopted. But, due consideration should be given to pacify *Upadrava* or *Udarka*.

Significance of Kriyakala

संचयेऽपहृता दोषा लभन्ते नोत्तरा गतीः॥
ते तूत्तरासु गतिषु भवन्ति बलवत्तराः॥37॥ Su.Su. – 21/37
न्नाह,-संचयेऽपहृता दोषा इति।
तेषामपहरणं च बहुदोषे शोधनं, मध्यदोषे लङ्घनपाचनं,
अल्पदोषे संशमनमिति॥37॥ Su.Su. – 21/37, Dalhana

Further, *Dalhana* says in *Sanchaya* stage, mild form of management is sufficient to pacify *Dosha*. For *Alpa Dosha Samshamana*; for *Madhya Dosha*, *Langhana Pachana* and for *Bahudosha*, *Shodhana* are necessary to get the alleviation of *Dosha*.

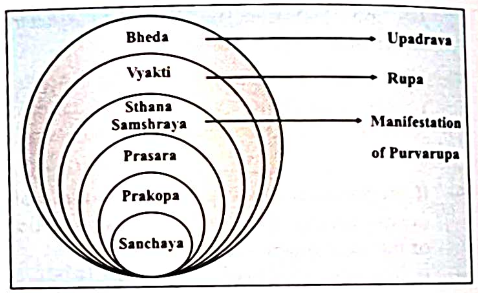


Fig. 8.1: Different stages of Kriyakala

- ⇨ If proper treatment is given in 1st stage (*Sanchaya*) of *Kriyakala*, the accumulated *Dosha* will not attain next stage of *Kriyakala*. The person recovers very rapidly.
- ⇨ If treatment is neglected in 1st stage of *Kriyakala*, then it will attain next stages of *Kriyakala* and the treatment will become very difficult when these vitiated *Doshas* attain subsequent stages of *Kriyakala*.

Relation Between Shat Kriyakala And Nidana Panchaka

The stages of *Kriyakala* are

1. *Sanchayavastha* – *Prathama Kriyakala* – stage of accumulation
2. *Prakopavastha* – *Dvitiya Kriyakala* – stage of provocation
3. *Prasaravastha* – *Tritiya Kriyakala* – stage of circulation
4. *Sthanasamshrayavastha* – *Chaturtha Kriyakala* – stage of localisation
5. *Vyaktavastha* – *Panchama Kriyakala* – stage of manifestation
6. *Bhedavastha* – *Shashtha Kriyakala* – stage of complication

Nidana Panchaka are

1. ***Nidana*** – etiological factor
2. ***Purvarupa*** – prodromal symptoms
3. ***Rupa*** – symptoms or clinical features
4. ***Upashaya* and *Anupashaya*** – factors which will improve and worsen the disease condition
5. ***Samprapti*** – pathogenesis

First 3 stages show *Dosha Lakshana* and last 3 stages show *Vyadhi Lakshana*. In *Dosha Lakshana*, there will be the involvement of vitiation of *Dosha* only where as in case of *Vyadhi Lakshana*, there will be mixture of *Dosha* and *Dushya*

- ⇨ When the person is exposed to any of the etiological factor, we can observe the three modes of action in the body which will happen sequentially
  - ❑ *Dosha* vitiation
  - ❑ *Khavaigunya*
  - ❑ *Dhatu* abnormality
- ⇨ From the exposure to etiological factor till the manifestation of *Purvarupa*, *Sanchaya*, *Prakopa*, *Prasara* and *Sthanasamshraya* stages happen
- ⇨ In *Vyakta* stage of *Kriyakala*, the *Rupa* (clinical features) appear in the body
- ⇨ In *Bheda* stage of *Kriyakala*, *Upadrava* (complications) appear in the body
- ⇨ From *Sanchaya* till *Bhedavastha*, *Samprapti* happens in the body
- ⇨ Among *Nidana Panchaka*, *Upashaya* and *Anupashaya* cannot be correlated in relation to *Kriyakala*. On administration of *Upashaya* after the improvement in the presenting complaints, then we can observe the reversal in stages of *Kriyakala*, whereas if the person shows worsening in the clinical presentation then we can see the further progression of the *Dosha* vitiation in stages of *Kriyakala*.

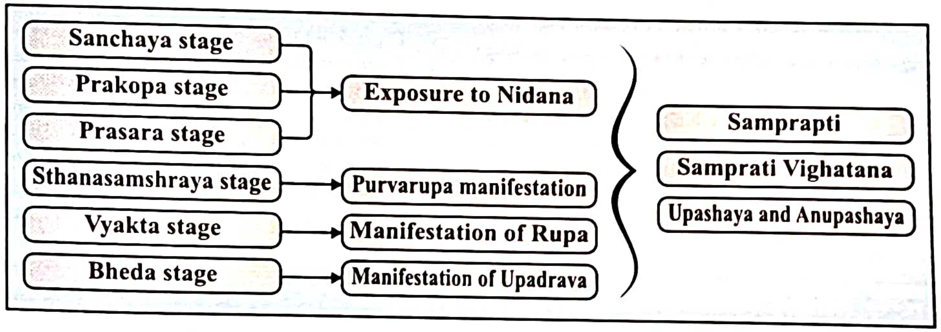


Fig. 8.2: Different stages of Kriyakala and Nidana Panchaka

Relevance of Shat Kriyakala in the current era[1]

- ⇨ It is being in the textbook, *Rogah Sarve Api Mandagnou*. That means all diseases manifest due to the poor function of Agni (digestive fire). This will lead to the less formation of *Ahara Rasa* (highly essential fluid of the body present in the alimentary canal) and more formation of *Ama* will be formed. *Ama* is having the qualities similar to the *Kapha Dosha* thus, until and unless the measures to pacify *Ama* is being taken, this will persist in the body in for longer duration.
- ⇨ Almost all the patients who visit the physician are usually in the stage of *Sthana Samshrayavastha* (stage of manifestation of prodromal symptoms), *Vyakta* (stage of complete manifestation of disease) and *Bhedavastha* (stage of complication). It is the duty of the physician to identify the actual stage of clinical presentation so that arrest of the progression of the disease can be prevented.

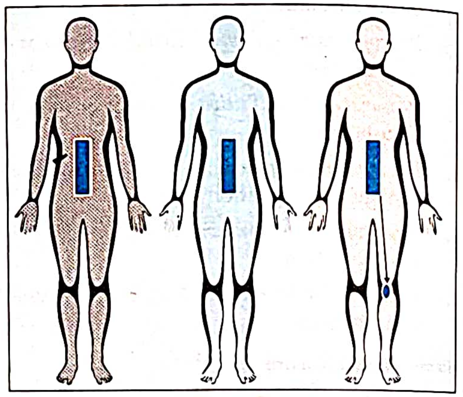


Fig 8.3: Relevance of Shat Kriyakala in the current era

Chapter Resources

1. Sushruta Samhita, Charaka Samhita, Ashtanga Sangraha and Ashtanga Hridaya excerpts

Key points of the chapter

- ⇨ क्रियाकालः कर्मावसरः। Su.Su. – 21/19, Dalhana Kriyakala comprises of two words – Kriya (treatment) and Kala (time). If we add the two words together, Kriyakala refers to the time of treatment. This is the contribution of Sushruta.
- ⇨ संचयं च प्रकोपं च प्रसरं स्थानसंश्रयम्।। व्यक्तिं भेदं च यो वेत्ति दोषाणां स भवेद्भिषक्।।Su.Su.–21/36. **There are six stages in Kriyakala– Sanchaya, Prakopa, Prasara, Sthanasamshraya, Vyakti** and **Bheda**. The first 3 stages are preclinical stage which will show Dosha Lakshana and last 3 stages are clinical stage which will show Vyadhi Lakshana.
- ⇨ **Sanchaya stage is the 1st stage of Kriyakala,** in this stage, the Dosha will accumulate in its own sites in Koshtha. This is quantitative accumulation not qualitative increase. This is exhibited by specific Lakshana such as Stabdha and Purnakoshthata in case of Vata Sanchaya; Pitavabhasata and Mandoshmata in case of Pitta Sanchaya; Gourava and Alasya in case of Kapha Sanchaya stage. Apart from these Lakshana, the person will have aversion towards the etiological factors responsible for the increase of Dosha.
- ⇨ **Prakopa is the 2nd stage of Kriyakala,** the vitiated Dosha gets swollen in their own accumulated sites. This is exhibited by the clinical features such as Koshthatoda and Sancharana in case of Vata Prakopa; Amlika, Paridaha and Dhumayana in case of Pitta Prakopa; Annadvesha and Hridayotkleda in case of Kapha Prakopa.
- ⇨ **Prasara is the 3rd stage of Kriyakala.** In this stage, the provocated Dosha in their own sites, starts to move all over the body. This is usually presented with clinical features such as Vimargagamana and Atopa in case of Vata Prasara; Osha, Chosha, Paridaha and Dhumayana in case of Pitta Prasara; Arochaka, Avipaka, Angasada and Chardi in case of Kapha Prasara.
- ⇨ **Sthana Samshraya is the 4th stage of Kriyakala.** In this stage, the vitiated Dosha circulating all over the body gets entangled with the Dhatu where Khavaigunya (deformity of Srotas) and stays in the Dhatu leading to the commencement of Dosha Dushya Sammurchana. This is leading to the manifestation of Purvarupa.
- ⇨ **Vyakti is 5th stage of Kriyakala.** In this stage, complete manifestation of the disease along with clear cut Dosha vitiation can be identified.
- ⇨ **Bheda is the 6th stage of Kriyakala,** where in Asadhya Lakshana (incurability of the illness), Upadrava (complications), Arishta Lakshana (signs of imminent dieath) etc can be observed.
- ⇨ संचयेऽपहृता दोषा लभन्ते नोत्तरा गतीः।। ते तूत्तरासु गतिषु भवन्ति बलवत्तराः।। Su.Su. – 21/37 If proper treatment is given 1st stage (Sanchaya) of Kriyakala, the accumulated Dosha will not attain next stage of Kriyakala. The diseased individual recovers rapidly.

GK [1] Blue coloured rectangle is the site of *Dosha Utpatti* (formation of *Dosha*) – *Sanchaya* and *Prakopa* stage
From this blue coloured rectangle, arrows in all directions should be drawn (*Prasara* stage)
An example of wound in the lower limb, we have to show ulcer (*Sthanasamshraya, Vyakti* and *Bheda*)
The image can be reframed. The same image need not be maintained.

Probable questions may be asked in the examination

Long essays

- ⇨ Write Shat Kriyakala in detail
- ⇨ Shat Kriyakala, write in detail Avasthanusara Dosha Lakshana and significance .
- ⇨ Describe in detail about Shat Kriyakala and write its importance in Roga Vinischaya
- ⇨ Describe Shat Kriyakala and its application on local inflammation
- ⇨ What do you mean by Shat Kriyakala? Describe Shat Kriyakala in detail. Describe the relationship in between Shat Kriyakala and Nidana Panchaka

Short essays

- ⇨ Write the relation between Nidana Panchaka and Shat Kriyakala
- ⇨ Explain the significance of Shat Kriyakala with examples
- ⇨ Write about Sthana Samshraya
- ⇨ Write about Shat Kriyakala
- ⇨ Explain Shat Kriyakala with their Lakshana
- ⇨ Describe Purvarupa Utpatti Kriya
- ⇨ Difference between Dosha Lakshana and Vyadhi Lakshana
- ⇨ Bhedavastha
- ⇨ Explain in detail about Sthana Samshraya

Short answers

- ⇨ Doshanam Sanchayavastha
- ⇨ Sthana Samshraya
- ⇨ Chaturtha Kriyakala
- ⇨ Prasara
- ⇨ Kriya Kala
- ⇨ Sanchaya
- ⇨ Chaya Avastha
- ⇨ Prakopa Avastha
- ⇨ Vyakta Avastha
- ⇨ Bheda Avastha
- ⇨ Dosha Prasaravastha

- ⇨ Write the Lakshana of Dosha Sanchaya

MCQs

1. **Kriyakala is the contribution of**
   - a. Charaka;
   - b. Sushruta;
   - c. Yoga Ratnakara;
   - d. Vagbhta

   Answer -(b)
2. **The Lakshana observed in which of the following stage of Kriyakala is not included in Dosha Lakshana?**
   - a. Sthana Samshraya;
   - b. Sanchaya;
   - c. Prasara;
   - d. Prakopa

   Answer -(a)
3. **Pitavabhasata (yellowish discolouration) is seen in which of the following stage?**
   - a. Pitta Prakopa;
   - b. Pitta Sanchaya;
   - c. Pitta Prasara;
   - d. Pitta Sthana Samshraya

   Answer -(b)
4. **Khavaigunya starts from which stage of Kriyakala?**
   - a. Sanchaya;
   - b. Prasara;
   - c. Sthana Samshraya;
   - d. Vyakti

   Answer -(a)
5. **Purvarupa (prodromal symptoms) will develop in which of the following stage of Kriyakala?**
   - a. Sanchaya;
   - b. Prasara;
   - c. Sthana Samshraya;
   - d. Vyakti

   Answer -(c)
6. **Upadrava (complication), Arishta (signs of imminent death) will develop in which of the following stage of Kriyakala?**
   - a. Sanchaya;
   - b. Sthana Samshraya;
   - c. Vyakti;
   - d. Bheda

   Answer -(d)
7. **Dosha Dushya Sammurchana starts to manifest in which of the following stage of Kriyakala?**
   - a. 1st stage;
   - b. 2nd stage;
   - c. 3rd stage;
   - d. 4th

   Answer -(d)
8. **The Sanchaya of Vata Dosha takes place in**
   - a. Amashaya;
   - b. Pakvashaya;
   - c. Both 1 and 2;
   - d. Pakvashaya, Tvak etc sites of Vata Dosha

   Answer -(b)
9. **Stage of localization is**
   - a. Sanchaya;
   - b. Sthana Samshraya;
   - c. Bheda;
   - d. Vyakti

   Answer -(b)
10. **As per Sushruta, the number of Kriyakala is**
    - a. 4;
    - b. 5;
    - c. 6;
    - d. 3

    Answer -(c)

***

Upadrava and Udarka

9

Learning objectives

- ⇨ What is Upadrava and Udarka?
- ⇨ How Upadrava is manifested?
- ⇨ To know the difference between Upadrava and Udarka
- ⇨ Relevance of Upadrava and Udarka in current era

The disease involves several stages from the exposure to aetiological factor till the complete manifestation of disease. Initially, the person may not show any symptoms, this is termed as latent phase of the disease. This is the stage where vitiated *Dosha* will aggravate in their own sites and then start circulating all over the body. When conducive environment for the vitiated *Dosha* to get stagnated in a particular place, aggravated *Dosha* will mix with the surrounding *Dushya* (*Dhatu* or *Mala*), start showing *Purvarupa* (premonitory symptoms). This stage is called *Sthana Samshrayavastha* (4th stage of *Kriyakala*).

There will be manifestation of complete clinical features after the progression of *Dosha Dushya Sammurchana* (conglomeration of *Dosha* and *Dushya*), this is called as *Vyaktavastha* (5th stage of *Kriyakala*).

Further commencement of *Dosha Dushya Sammurchana* will be leading to the manifestation of clinical features which is termed as *Upadrava* (*Anubandha*). This stage is called as *Bhedavastha* (6th stage of *Kriyakala*). In modern parlance, complication is the term used to denote *Upadrava*.

- ⇨ As per fundamentals, *Upadrava* is the disease manifested in the individuals by the vitiated *Dosha* which is responsible for the manifestation of primary disease.
- ⇨ It is manifested after the manifestation of the disease or along with the primary disease. In most of the occasions, it is not interfering with the treatment of the primary disease.
- ⇨ It is usually involving the same *Srotas* or related *Srotas* of the primary disease. For example, if the person is presented with the symptoms of Annavaha Srotas such as *Avipaka*, *Chardi* etc, he may likely to have complications related to *Purishavaha Srotas* or *Pranavaha Srotas*. If the person is presented with *Kapha* dominant illness, he may likely to have the complications of *Kapha Dosha* vitiation.

Upadrava is the state which may manifest soon after the manifestation of primary disease or will be present along with the primary disease or primary disease itself. If the person who is suffering from *Galaganda*, and he develops *Jvara* in the meantime that *Jvara* is not considered as the *Upadrava* of *Galanganda*. *Jvara* is separate disease entity.

Synonyms: Anubandha,[1] Oupasargika[2]

Types of *Upadrava*: *Sthula Upadrava* (major complications) and

(b) *Anu Upadrava* (minor complications). Normally, *Upadrava* are going to subside if we give adequate management to main disease. In case of *Sthula Upadrava*, we

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GK
[1] Refer the context of Vyadhi Vargikarana in the context of Anubandhya and Anubandha Vikara
[2] Refer the context Vyadhi Vargikarana in the context of Aupasargika, Prakkevala and Anyalakshana Vikara

have to give treatment first to the major complications to save the life of the patient. In case of *Anu Upadrava*, these will subside after getting the treatment for the main disease. Let us learn this concept by illustrating the concept with example. For example, 45 years old male patient known alcoholic presented to you with yellowish discolouration of the eyes, and urine, we may predict the mild form of *Upadrava* if the person is presented with loss of appetite. If the same person is presented to you with history of enlargement of abdomen or vomiting of the blood, then we may consider the *Sthula Upadrava* that the patient is having. In the former occasion, vigorous treatment is not required than from that of latter situation.

Upadrava of Ajirna

Murcha (altered state of consciousness), *Pralapa* (irrelevant speech), *Vamathu* (vomiting), *Praseka* (excessive salivation), *Sadana* (sluggish movement of body parts), *Bhrama* (giddiness) and *Marana* (death) are the possible *Upadrava* of the *Ajirna*. Among these complications, *Praseka, Vamathu, Sadana* can be considered as *Anu Upadrava* and *Murcha, Pralapa* and *Marana* can be considered as *Sthula Upadrava*.

⇨ In this disease, the main *Srotas* afflicted will be *Annavaha Srotas*. Here, the main function of *Annavaha Srotas* i.e. *Sara Kitta Vibhajana* (separation of essential nutrient and metabolites) will be deranged. That means *Ahara Rasa* formation will be disturbed and this could be the main reason for the development of all *Upadrava*. *Praseka* and *Vamathu* are related to dysfunction of *Mahasrotas* and rest of the features can be considered to be attributable to the hampered nutrition to the *Rasavaha Srotas*. *Sadana* (sluggish movement) can be attributable to the alimentary canal. This is attributable to the accumulation of *Ama* (undigested material sticking to the *Mahasrotas* (alimentary canal). These can be considered as *Anu Upadrava*. Rest of the *Upadrava* are indicative of deeper *Dhatu* involvement. That is the reason, they are considered as *Sthula Upadrava*.

मूर्च्छा प्रलापो वमथुः प्रसेकः सदनं भ्रमः।
उपद्रवा भवन्त्येते मरणं चाप्यजीर्णतः॥1 3॥
Ma.Ni. – 6/13

References

1. उपद्रवो रोगारम्भकदोषप्रकोपज-न्योऽन्यविकारः Ma.Ni. – 1/2, Madhu
2. 'व्याधेरुपरि यो व्याधिर्भवत्युत्तरकालजः। उपक्रमाविरोधी च स उपद्रव उच्यते। Ma.Ni. – 1/2, Madhu
3. उपद्रवोऽनुबन्धः। Ma.Ni. – 1/5, Madhu
4. उपद्रवस्तु खलु रोगोत्तरकालजो रोगाश्रयो रोग एवं स्थूलोऽणुर्वा, रोगात् पश्चाज्जायत इत्युपद्रवसंज्ञः। तत्र प्रधानो व्याधिः, व्याधेर्गुणभूत उपद्रवः, तस्य प्रायः प्रधानप्रशमे प्रशमो भवति॥ Ca.Ci. – 21/40
   प्रकारमाह-स्थूलोऽणुर्वेति।
   उपद्रवसंज्ञा-निरुक्तिमाह-पश्चाज्जायत इति उपद्रवसंज्ञ इति।
   एतेन उपद्रवति व्याध्युत्पादसमीपे उपैतीति उपद्रवः, इति निरुक्तिः कृता भवति। Ca.Ci. -21/40, Chakra
   व्याधेर्गुणमूल शमाधीनप्रशमत्वादुपद्रवस्या-प्राधान्यमित्यर्थः। Ca.Ci. – 21/40
5. वलोऽन्यलक्षण इति।
   तत्र, औपसर्गिको यः पूर्वोत्पन्नं व्याधिं जघन्यकालजातो व्याधिरुपसृजति स तन्मूल एवोपद्रवसंज्ञः; प्राक्केवलो यः प्रागेवो Su.Su. – 35/18

The term *Udarka* means sequel of any pathological event happening on the surface or inside the body.

उदर्क उत्तरकालीनं फलम्। Ca.Su. – 25/36, Chakra

⇨ This may be either harmful or non harmful effects. In other words, *Upadrava* can also be considered as *Udarka*.

⇨ **Types of *Udarka*:** 2 types of *Udarka* are being explained in *Charaka Samhita*.

⇨ द्विविध प्रभावः. हिताहितोदर्क विशेषात्...।। Ca.Su. – 25/36
Two types of *Udarka* are *Hita* (harmless) *Udarka* and *Ahita* (harmful) *Udarka*.

For example, when the person is presented with wound in the skin, this will be healed by fibrosis of the wound tissue. This is considered to be the sequel and it is not a life threatening situation and it only causes disfiguration of the body tissue where wound has occurred.

⇨ Whereas, when the person is presented with **increased frequency of loose stools** for more than 30 times, the person may be having sunken eyes, thready pulse and hypotension, and if not treated it may lead to altered consciousness. This is a life threatening situation unless it is managed appropriately.

⇨ When the person is **recovering from the Pranavaha Srotas,** he may be presented with dry cough for a week or fortnight, then it can be considered as *Udarka*. In this case, it is not a life threatening condition.

⇨ When a person is **presented with Pranavaha Srotovikara,** he may initially present with dry cough (*Vata* dominant) and this is followed by productive (*Kapha* dominant) cough. In this situation, *Udarka* is productive cough as it is occurring as a sequel to dry cough.

⇨ When the person is **suffering from *Pandu*** (spectrum of diseases where yellowish white discolouration is seen), he may likely to suffer from *Kamala* (jaundice). In this occasion, *Kamala* which may progress to *Halimaka* or *Kumbhakamala* is *Udarka* as well as *Upadrava*.

⇨ When the person is **presented with *Arishta Lakshana*** (bad prognostic signs) or complete appearance of the *Upadrava* (complications), it is *Udarka* as well as *Upadrava*.

⇨ The **pathogenesis in *Prameha*** may progress to a stage of *Madhumeha*. This is an example of *Upadrava* as well as *Udarka*.

Table 9.1: Difference between Upadrava and Udarka

Upadrava	Udarka
1. Can be always harmful for example, vomiting of blood in Kumbhakamala	1. May or may not be harmful, for example, healing of wound by fibrosis and occurrence of death following excess Atisara (diarrhoea)
2. Two subtypes are mentioned - Sthula (major) and Anu (minor)	2. Two subtypes of Udarka are mentioned in Ayurveda literatures – Hita Udarka and Ahita Udarka
3. Can be occurring during the main disease or after the main disease	3. Can occur as soon as the entry of aetiological factor in the body
4. Can manifest from Bhedavastha	4. Can manifest from Sanchayavastha

Very Important Point to be highlighted: By the above description, we can infer that all *Upadravas* (complication) can be considered as *Udarka* (sequel), but all *Udarka* cannot be considered as *Upadrava*.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya, Madhava Nidana excerpts

Key points of the chapter

⇨ 'व्याधेरुपरि यो व्याधिर्भवत्युत्तरकालजः। उपक्रमाविरोधी च स उपद्रव उच्यते। Ma.Ni. – 1/2, Madhu

⇨ उपद्रवस्तु खलु रोगोत्तरकालजो रोगाश्रयो रोग एवं स्थूलोऽणुर्वा, रोगात् पश्चाज्जायत इत्युपद्रवसंज्ञः। तत्र प्रधानो व्याधिः, व्याधेर्गुणभूत उपद्रवः, तस्य प्रायः प्रधानप्रशमे प्रशमो भवति।। Ca.Ci. – 21/40

⇨ The above two definitions highlight the definition of Upadrava. It is usually caused by the same vitiated Dosha responsible for the manifestation of the disease. It can manifest either along with the disease or after the manifestation of the disease. It usually involves similar Srotas or nearby Srotas. It is of two types – Sthula (major) and Anu (minor) Upadrava.

- ⇨ उदर्क उत्तरकालीनं फलम्। Ca.Su. – 25/36, Chakra

Udarka is nothing but the sequel of any pathological event happening on the surface or inside the body. It may be either Ahita (harmful) or Hita (harmless). This can occur as soon as the exposure of the patient to the Nidana.

Probable questions may be asked in the examination

Short essays

- ⇨ Explain the various definitions of Upadrava and types of Upadrava with examples
- ⇨ Explain the difference between Upadrava and Udarka with examples
- ⇨ Upadrava

Short answers

- ⇨ Upadrava
- ⇨ Definition of Upadrava
- ⇨ Udarka
- ⇨ Distinguish between Upadrava and Udarka
- ⇨ Write in short about Udarka

MCQs

1. **Upadrava can be seen in ------ stage of Kriyakala.**
   a. Sanchaya;
   b. Vyakti;
   c. Bheda;
   d. Sthana Samshraya

   Answer -(c)
2. **Udarka can be seen from ------- stage of Kriyakala.**
   a. Sanchaya;
   b. Vyakti;
   c. Bheda;
   d. Sthana Samshraya

   Answer -(a)
3. **Types of Udarka as per Charaka**
   a. Two;
   b. Three;
   c. Four;
   d. No types are mentioned

   Answer -(a)
4. **Types of Upadrava as per Charaka**
   a. Two;
   b. Three;
   c. Four;
   d. No types are mentioned

   Answer -(a)
5. **Which of the following is/are the synonym of Upadrava?**
   a. Anubandha;
   b. Oupasargika Roga;
   c. Both 1 and 2;
   d. None of the above

   Answer -(c)
6. **Which of the following regarding Upadrava is correct?**
   a. Same Dosha responsible for disease causation is leading to Upadrava;
   b. Same Srotas will be involved in the Upadrava manifestation;
   c. Srotomula involvement can be observed;
   d. All of the above

   Answer -(d)

***

Concept of Arishta

10

Learning objectives

- ⇨ To know the meaning of Arishta
- ⇨ To know the types of Arishta
- ⇨ Factors to be examined to assess the concept of Arishta
- ⇨ To know the relevance of Arishta in current era

Meaning of Arishta

नियतमरणख्यापकं लिङ्गमरिष्ट Ma.Ni. – 1/3, Madhu

इन्द्रशब्देन प्राण उच्यते, तस्यान्तगतस्य लिङ्गं रिष्टाख्यमिन्द्रियं; Ca.I. – 1/2, Chakra

क्रियापथमतिक्रान्ताः केवलं देहमाप्लुताः।
चिह्नं कुर्वन्ति यद्दोषास्तदरिष्टं निरुच्यते॥29॥
Ca.I. – 11/29

- ⇨ The word *Arishta* refers to the *Lakshana* (signs) of forthcoming death[1]. These are the symptoms which indicate the end of life of an individual.
- ⇨ When the disease spreads *Abhyantara* or *Madhyama* or *Bahya Rogamarga*; when vitiated *Doshas* all over the body and when the diseased individual will not respond to any kind of treatment, then *Arishta* can be seen in such individuals.

Types of Arishta

2 types – *Sthayi* and *Asthayi* A.Hr.Sha. – 5/3; Su.Su. – 28/2-3; Dalhana

2 types – *Niyata* and *Aniyata*; Su.Su. – 28/2-3; Dalhana

2 types – *Purusha Ashrita* and *Purusha Anashrita*; Ca.I. – 1/4

2 types of *Purusha Ashrita Arishta* – *Prakriti* and *Vikriti*; Ca.I. – 1/4

6 types of *Prakrititah Purusha Ashrita Arishta*– *Jatiprasakta, Kulaprasakta, Deshanupatini, Kalanupatini, Vayo Anupatini* and *Pratyatma Niyata*; Ca.I. – 1/5

3 types of *Vikrititah Purusha Ashrita Arishta* – *Lakshana Nimitta, Lakshya Nimitta* and *Nimitta Anurupa*; Ca.I. – 1/5

To understand the concept of *Arishta* better, we need to learn these different terminologies.

The term *Sthayi* refers to symptoms of imminent death which persist permanently in the patient and *Asthayi* refers to the symptoms which persist for a shorter time duration in the individual.

The term *Niyata* refers to the similar meaning of *Sthayi Arishta Lakshana*, This type of *Arishta* persists permanently in the patient and *Aniyata Lakshana* refers to the *Arishta* persist for a shorter duration.

The term *Purusha Ashrita Arishta Lakshana* refers to the signs of imminent death which are observed on or inside the patient. Whereas the term *Purusha Anashrita Arishta Lakshana* are those features of imminent death which are not observed on or inside the patient, in stead, they are observed in the surrounding or when the

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GK

[1] Differential diagnosis of death includes all states in which loss of cardio-respiratory or brain function is reversible. The two main clinical conditions in which distinction has to be made are
1. Cardiac and respiratory arrest are of very recent onset
2. Cardiac and respiratory action are being artificially sustained by mechanical ventilation

physician is visiting the house of the patient or any messenger conveying the information regarding the illhealth of the patient or the dreams observed in the patient.

Now we will discuss the *Prakritith Purusha Ashrita Arishta Lakshana*.

Jati Prasakta: This type of *Lakshana* is related to occupation as per olden Indian tradition. Based on occupation, four types of *Jati* are being mentioned. *Brahmana, Kshatriya, Vaishya* and *Shudra*. As per olden occupation, *Brahmana* is the class which was associated with activities such as learning, teaching etc. These class of people were not doing heavy physical exertion inducing activities.

Kula Prasakta: this type of *Arishta Lakshana* is related with activities related to familial tradition. For example, families having the occupation of goldsmith class, they are usually doing less strenuous activities when compared to the families having the occupation of blacksmith class.

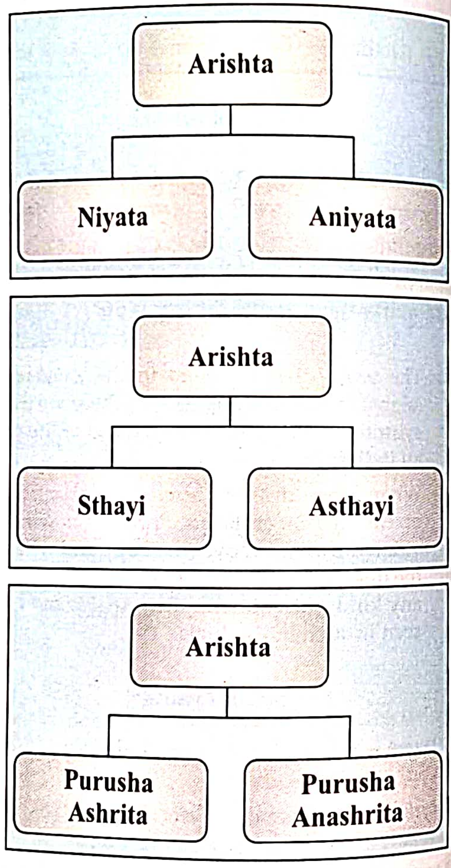
Desha Anupatini: This type of *Arishta Lakshana* is related to the indoor or outdoor activities of the people. In general, the people residing inside the home are comparatively clean when compared to the people who will do the activities outside in the field etc.

Kala Anupatini: This type of *Arishta Lakshana* is related to the time of the evolution of human mankind. People of *Kritayuga* are considered to be clean than the people belonging to *Kaliyuga*.

Vayo Anupatini: This type of *Arishta Lakshana* is related to the age of the individual. In childhood, due to the excess activities in the mud etc by the children, they are exposed to more pathogens which may lead to many diseases.

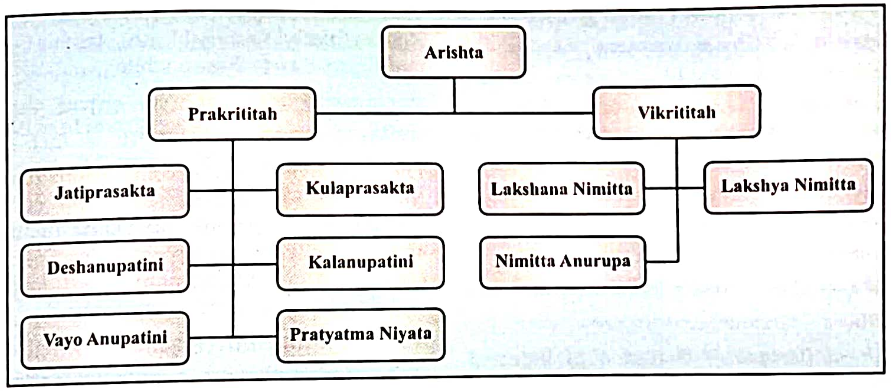
Pratyatma Niyata: This type of *Arishta Lakshana* is related to the individual strength of the individual. More physical or mental strength of the individual may lead to peak of the health and poor physical or mental strength may lead to various ailments of the body.

Laskhana Nimitta: The symptoms seen in this type have no tracable link with the present life of the related person. Hence, these are said to be manifested due to the deeds done by the same individual in his previous life or due to the influence of supra human power.



Flowchart 10.1: Classification of Arishta

To understand the concept of *Arishta* better, we need to learn these different terminologies.



Flowchart 10.2: Classification of Prakrititah and Vikritita h Purusha Adharita Arishta Lakshana

Laskhana Nimitta: The symptoms seen in this type have no tracable link with the present life of the related person. Hence, these are said to be manifested due to the deeds done by the same individual in his previous life or due to the influence of supra human power.

Lakshya Nimitta: The symptoms observed in this type of *Arishta Lakshana*, the law of cause and effect is applicable. In other words to say, we can able to connect the link between the *Lakshana* observed in the patient and manifestation of *Arishta Lakshana*

Nimitta Anurupa: The symptoms observed in this type of *Arishta Lakshana*, consumption of a particular *Nidana* will not produce usual *Lakshana* it will produce a deviant symptom. For example, the consumption of *Ruksha* quality food substance in this occasion will cause *Vata Shamana* unlike *Vata Prakopa* in usual situations.

- **Factors to be examined to assess the concept of Arishta:**

1. ***Varna*** – Complexion and other visible characters of the skin and other parts of the body
2. ***Svara*** – Voice and the abnormalities of voice including the absence of voice
3. ***Gandha*** – Smell and abnormalities of smell including the absence of smell perception
4. ***Rasa*** – Taste and abnormalities of taste including the absence of taste perception
5. ***Sparsha*** – Touch and abnormalities of touch including absence of touch perception
6. ***Chakshu*** – Organ responsible for vision
7. ***Shrotra*** – Sense organ responsible for hearing
8. ***Ghrana*** – Sense organ responsible for smell
9. ***Rasana*** – Sense organ responsible for taste
10. ***Sparshana*** – Sense organ responsible for touch
11. ***Satva*** – Mind
12. ***Bhakti*** – Inclination
13. ***Shaucha*** – Cleanliness
14. ***Shila*** – Conduct
15. ***Achara*** – Ritual or conditioned behaviour or acquiring skills
16. ***Smriti*** – Memory
17. ***Akriti*** – shape of body parts or whole body
18. ***Prakriti*** – normalcy
19. ***Vikriti*** – Abnormalcy
20. ***Bala*** – Strength
21. ***Glani*** – Exhaustion
22. ***Medha*** – Intelligence
23. ***Harsha*** –
24. ***Raukshya*** – Dryness
25. ***Sneha*** – Unctuousness

26. ***Tandra***– Drousiness
27. ***Arambha***– Commencement of *Arishta Lakshana*
28. ***Gaurava***– Heaviness in *Nishthyuta* (sputum); *Purisha* (faecal matter); Retas (semen) etc
29. ***Laghava***– Lightness observed in the parts which are usually Guru
30. ***Guna***– Qualities or attributes
31. ***Ahara***– Diet or food pattern
32. ***Vihara*** – Regimen or activities
33. ***Ahara Parinama***– Digestion of ingested food
34. ***Upaya***– Management
35. ***Apaya***– Disappearance of disease
36. ***Vyadhi***– cardinal feature of disease
37. ***Vyadhi Purvarupa***– prodromal symptom of the disease
38. ***Vedana***– Discomfort
39. ***Upadrava***– Complications
40. ***Chaya***– Lustre
41. ***Praticchaya***– Shadow
42. ***Svapna Darshana***– Appearance of dreams during sleep
43. ***Dutadhikara***– Messenger
44. ***Pathi Chautpatikam***– Bad omens observed by the physician on his way to patient's house
45. ***Aturakule Bhavavasthantarani***– Bad omens observed by the physician in the patient's house
46. ***Bheshaja Samvritti***– Administration of proper therapy
47. ***Bheshaja Vikara Yukti***– Observation of the effect of the medicine on the patient

Varna: (complexion)

कृष्णाः, श्यामः, श्यामावदातः, अवदातश्चेति प्रकृतिवर्णाः शरीरस्य भवन्ति;

Ca.I. – 1/8

The word '*Varna*' literally means complexion. There are four types of natural complexions, *Krishna* (black), *Shyama* (bluish), *Avadata* (white) and *Shyamavadata* (bluish white).

नीलश्यावताम्रहरितशुक्लाश्च वर्णाः शरीरस्य वैकारिका भवन्ति; यांश्चापरानुपेक्षमाणो विद्यात्। Ca.I. – 1/8

There are five abnormal complexions namely, *Nila* (blue), *Shyava* (blackish), *Tamra* (coppery colour), *Harita* (green) and *Shukla* (albinotic, abnormally white). It also includes *Glani* and *Harsha* (emaciation and plumpness), *Raukshya* and *Sneha* (dryness and unctuousness).

तत्र प्रकृतिवर्णमर्धशरीरे विकृतिवर्णमर्धशरीरे, द्वावपि वर्णौ मर्यादाविभक्तौ दृष्ट्वा; यद्येवं सव्यदक्षिणविभागेन, यद्येवं पूर्वपश्चिमविभागेन, यद्युत्तराधरविभागेन, यद्यन्तर्बहिर्विभागेन, आतुर-स्यारिष्टमिति विद्यात्; एवमेव वर्णभेदो मुखेऽप्यन्यत्र वर्तमानो मरणाय भवति॥9॥

Ca.I. – 1/9

Further, *Varna* has to be analysed in terms of

- ⇨ Which half of the body is having normal complexion and which half of the body is having abnormal complexion?
- ⇨ Is there any demarcating line between the normal and abnormal complexion?
- ⇨ Whether abnormal complexions observed in the right side or left side?
- ⇨ Whether abnormal complexions observed in the upper part of the body or lower part of the body?
- ⇨ Whether abnormal complexions observed in the front portion or back portion of the body?
- ⇨ Whether abnormal complexions observed in internal parts or external parts of the body?
- ⇨ Whether abnormal complexions observed in face or any other part of the body?

वर्णभेदेन ग्लानिहर्षरौक्ष्यस्नेहा व्याख्याताः॥10॥

Ca.I. – 1/10

नखनयनवदनमूत्रपुरीषहस्तपादौष्ठादिष्वपि च वैकारिकोक्तानां वर्णानामन्यतमस्य प्रादुर्भावो हीनबलवर्णेन्द्रियेषु लक्षणमायुषः क्षयस्यभवति॥12॥

Ca.I. – 1/12

Appearance of any one or more of the abnormal colours in nails, eyes, face, stools, hands, legs and lips associated with reduction of strength, complexion and sensory perception also indicative of imminent death.

यच्चान्यदपि किंचिद्वर्णवैकृतमभूतपूर्वं सहसोत्पद्ये-तानिमित्तमेवहीयमानस्यातुरस्यशश्वत्,तदरिष्टमितिविद्यात्। इति वर्णाधिकारः॥13॥ Ca.I. – 1/13

Sudden and accidental appearance of any of the unusual morbid complexion is always indicative of weakness of the patient, thus indicative of imminent sign of death.

Svara **(voice):** *Charaka* has described normal and abnormal voices which will determine the signs of imminent death.

स्वराधिकारस्तु-हंसक्रौञ्चनेमिदुन्दुभिकलविङ्ककाक-पोतजर्जरानुकाराः प्रकृतिस्वरा भवन्ति; Ca.I. – 1/14

Normal human voice resembles the voice of *Hamsa* (swan), *Krauncha* (crane), *Nemi* (wheel), *Dundubhi* (kettle drum), *Kalavinka* (house sparrow), *Kaka* (crow), *Kapota* (pigeon), *Jarjara* (a type of drum).

एडककलग्रस्ताव्यक्तगद्गदक्षामदीनानुकीर्णास्त्वा-तुराणां स्वरा वैकारिकाा भवन्ति; Ca.I. – 1/14

Vaikrita Svara (abnormal voice) resembles that of *Edaka* (sheep), *Kalagrasta* (feeble), *Avyakta* (inaudible), *Gadgada* (indistinct), *Kshama* (hoarse), *Dina* (painful), *Anukirna Svara* (stammering).

If abnormal type of voice[2] manifests spontaneously or in an individual, there are many abnormal types of voice or if only one abnormal voice in individual appears to be of diverse types indicates imminent sign of death.

Gandha (smell)

न्नानापुष्पोपमो गन्धो यस्य भावित दिवानिशम्।
पुष्पितस्य वनस्येव नानाद्रुमलतावतः॥8॥
तमाहुः पुष्पितं धीरा नरं मरणलक्षणैः।
स ना संवत्सराद्देहं जहातीति विनिश्चयः॥9॥ Ca.I. – 2/8-9

The person who emits the fragrance of several flowers day and night, as if in case of garden containing various types of trees and creepers full of flowers and such a person is termed as *Pushpita*. The life span of such an individual is one year.

Rasa (taste)

This is analysed by the inference

कश्चिदेवास्यवैरस्यमत्यर्थमुपपद्यते।
स्वादुत्वमपरश्चापि विपुलं भजते रसः॥19॥
तमनेनानुमानेन विद्याद्विकृतिमागतम्।
मनुष्यो हि मनुष्यस्य कथं रसमवाप्नुयात्॥20॥
मक्षिकाश्चैव यूकाश्च दंशाश्च मशकैः सह।
विरसादपसर्पन्ति जन्तोः कायान्मुमूर्षतः।
अपि स्नातानुलिप्तस्य भृशमायान्ति सर्वशः॥22॥

Ca.I. – 2/19-22

- ⇨ In the situations where in flies, lice, wasps and mosquitoes get away from the body of a moribund person, we can infer that the person is having abnormal taste.
- ⇨ On the other hand, flies repeatedly surround the body of a moribund person, we can infer that the person is having extreme sweet taste, which can be observed even after taking bath and has applied *Lepa* (unguentum) to the body.

Sparsha (touch) related Arishta

तद्यथा-सततं स्पन्दमानानां शरीरदेशानामस्पन्दनं, नित्योष्मणां शीतीभावः, मृदूनां दारुणत्वं, श्लक्ष्णानां खरत्वं, सतामसद्भावः, सन्धीनां स्त्रंसभ्रंशच्यवनानि; मांसशोणितयोर्वीतीभावः, दारुणत्वं, स्वेदानुबन्धः, स्तम्भो वा; यच्चान्यदपि किञ्चिदीदृशं स्पर्शानां लक्षणं भृशविकृतमनिमित्तं स्यात्। इति लक्षणं स्पृश्यानां भावानामुक्तं समासेन॥4॥

Ca.I. – 3/4

- ⇨ Absence of pulsation[3] in the parts or organs

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[2] Abnormal voice can be heard in cases of recurrent laryngeal nerve paralysis, chronic laryngitis and conditions of aphonia and vocal cord paralysis etc

[3] In areas of peripheral pulsations such as superficial temporal artery, carotid artery, brachial artery, radi-

of the body which pulsate normally and constantly

- ⇨ Coldness in organs[4] which usually remain constantly warm or hot
- ⇨ Hardness of the organs which are normally soft in nature
- ⇨ Roughness of the organs which are usually smooth in nature[5]
- ⇨ Absence of the organs which are normally present
- ⇨ Partial, minor or major dislocations[6] of the joints either downwards or sidewards
- ⇨ Extreme atrophy of muscles and deficiency of blood[7]
- ⇨ *Rogibala* is very less than *Rogabala*
- ⇨ Association of extreme sweating is seen in the patients[8]
- ⇨ Stiffness of the body parts[9]

Thorough examination of the patient to analyse Arishta Lakshana

तथाऽस्योच्छ्वासमन्यादन्तपक्ष्मचक्षुः केशलोमोदरनखाङ्गुलीरालक्षयेत्।
तस्य चेदुच्छ्वासोऽतिदीर्घोऽतिह्रस्वो वा स्यात्, परासुरिति विद्यात्।
तस्य चेन्मन्ये परिमृश्यमाने न स्पन्देयातां, परासुरिति विद्यात्।
तस्य चेद्दन्ताः परिकीर्णाः श्वेता जातशर्कराः स्युः, परासुरिति विद्यात्।
तस्य चेत् पक्ष्माणि जटावद्धानि स्युः, परासुरिति विद्यात्।
तस्य चेच्चक्षुषी प्रकृतिहीने, विकृतियुक्ते-अत्युत्पिण्डिते, अतिप्रविष्टे, अतिजिह्मे, अतिविषमे, अतिमुक्तबन्धने, अतिप्रसुते, सततोन्मिषिते, सततनिमिषिते, निमिषोन्मेषातिप्रवृत्ते, विभ्रान्तदृष्टिके, विपरीदृष्टिके, हीनदृष्टिके, व्यस्तदृष्टिके, नकुलान्धे, कपोतान्धे, अलातवर्णे, कृष्णपीतनीलश्यावताम्रहरितहारिद्रशुक्लवैकारिकाणां वर्णानामन्यतमेनातिप्लते वा स्यातां, तदा परासुरिति विद्यात्।
अथास्य केशलोमान्यायच्छेत, तस्य चेत् केशलोमान्यायम्यमानानि प्रलुच्येरन् न चेद्वेदयेयुस्तं परासुरिति विद्यात्।
तस्य चेन्नखा वीतमांसशोणिताः पक्वजाम्बववर्णाः स्युः, परासुरिति विद्यात्।
अथास्याङ्गुलीरायच्छेत् ; तस्य चेदङ्गुलय आयम्यमाना न स्फुटेयुः, परासुरिति विद्यात्॥6॥ Ca.I. – 3/6

- ⇨ The physician should carefully examine expiration, back of the neck, teeth, eyelashes, scalp hairs, body hairs, abdomen, nails and fingers of the patients. The following conditions are indicative of imminent death of the patient.
- ⇨ If the expiration is too prolonged or too short.
- ⇨ If there is no pulsation in the back of the neck or region of carotid arteries
- ⇨ If the teeth of the patient are adhered with dirt (excessively) white covered with sugar like particles
- ⇨ If the eyelashes of the patient are matted
- ⇨ If the eyes are devoid of natural characters and showing abnormal features such as
  - ☐ Excessively projected outside[10]
  - ☐ Excessively indrawn[11]
  - ☐ Excessively slanted[12]
  - ☐ Excessively uneven[13]
  - ☐ Excessively loose
  - ☐ Associated with excessive secretions[14]
  - ☐ Perpetually open[15]
  - ☐ Perpetually closed[16]
  - ☐ With increased frequency in opening and closing[17]
  - ☐ Associated with rolling, reverted, deficient or scattered vision
  - ☐ Associated with morbidity of *Nakulandhya* or blindness of mongoose where the individual sees every substance as white in day time
  - ☐ Associated with morbidity of *Kapotandhya* or blindness of pigeon where the individual sees every substance as black during day time
  - ☐ Sees every thing as fire brand in appearance[18]
  - ☐ Endowed with excessively black, yellow, blue, darkish brown, coppery green, turmeric yellow or white colour
- ⇨ If the scalp and body hairs of the patient get severed without pain when pulled
- ⇨ If the veins of the abdomen are visible or have such colours like darkish brown, coppery, blue, turmeric yellow and white
- ⇨ If the nails of the patient are devoid of flesh and blood and have the colour of *Pakva Jambu* (purplish colour)
- ⇨ If the finger joints do not produce cracking sound even when bent and pressed.

Indriya related Arishta

स्वस्थेभ्यो विकृतं यस्य ज्ञानमिन्द्रियसंश्रयम्।
आलक्ष्येतानिमित्तेन लक्षणं मरणस्य तत्॥5॥ Ca.I. – 4/5

If any morbidity develops out of healthy sense organs without any visible cause, this is indicative of imminent death. Let us take the example of *Sparsha* (touch) related *Arishta*.

उष्णाञ्छीतान् खराञ्छ्लक्ष्णान्मृदूनपि च दारुणान्।
श्पृश्यान् स्पृष्ट्वा ततोऽन्यत्वं मुमूर्षुस्तेषु मन्यते॥23॥

Ca.I. – 4/23[19]

If an individual has tactile sensation of coldness in heat, of smoothness in case of roughness or coarseness or softness in hardness and vice versa, that person is said to nearing death.

Purvarupa related Arishta

पूर्वरूपाणि सर्वाणि ज्वरोक्तान्यतिमात्रया।
यं विशन्ति विशत्येनं मृत्युर्ज्वरपुरःसरः॥4॥
अन्यस्यापि च रोगस्य पूर्वरूपाणि यं नरम्।
विशन्त्यनेन कल्पेन तस्यापि मरणं ध्रुवम्॥5॥

Ca.I. – 5/4-5

If all the premonitory symptoms of fever manifest themselves excessively, this is a sure sign of death preceded by fever.

- ⇨ Similarly, the premonitory symptoms of other diseases manifesting themselves excessively are sure signs of imminent death of the patient.
- ⇨ In 5th chapter of *Indriya Sthana*, several premonitory symptoms of different diseases are described which may indicate the sign of imminent death. For example,

शूलाटोपान्त्रकूजाश्च दौर्बल्यं चातिमात्रया।

GK

al artery, ulnar artery, femoral artery, popliteal artery, anterior tibial artery, posterior tibial artery, dorsalis pedis artery, there will be feeble or absent pulsations

[4] This is attributable to peripheral vaso constriction.

[5] These are usually attributable to malignant swellings.

[6] These are attributable to chronic neurological diseases or myopathies

[7] These are attributable to chronic neurological diseases or myopathies

[8] There will be association of hypovolemia

[9] Chronic neurological or musculo skeletal diseases will be associated with this type of clinical presentation

[10] In the patient suffering from hyperthyroidism in case of bilateral protrusion and cavernous sinus thrombosis in case of unileral protrusion of eyes

[11] Bilateral indrawing of eyeball is seen in severe dehydration and unilateral indrawing of eyeball is seen in absence of eyeball

[12] In the patients suffering from convergent or divergent squint

[13] In the patients of 3rd cranial palsy or 7th cranial palsy

[14] In patients suffering from nasolacrimal duct obstruction or infection of lacrimal gland etc

[15] In hyperthyroidism or in hydrocephalus or in Bell's palsy

[16] In patients suffering from myasthenia gravis

[17] Seen in tics.

[18] Seen in hypertensive retinopathy

[19] This set of symptoms are seen in the patients suffering from peripheral neuropathy.

नखादिषु च वैवर्ण्ये गुल्मेनान्तकरो ग्रहः॥12॥

Ca.I. – 5/12[20]

If the person is suffering from colicky type of pain, gurgling sound in the abdomen and intestine, excessive discolouration of the nails etc indicate that the person is suffering from *Gulma* and is approaching death soon.

Physical symptoms of the patient indicating Arishta Lakshana

श्वयथुर्यस्य कुक्षिस्थो हस्तपादं विसर्पति।
ज्ञातिसङ्घं स संक्लेश्य तेन रोगेण हन्यते॥12॥

Ca.I. – 6/12[21]

If the person is initially presented with swelling in the abdominal region followed by swelling in the hands and feet, such a person will die soon.

श्वयथुर्यस्य पादस्थस्तथा स्रस्ते च पिण्डिके।
शीदतश्चाप्युभे जङ्घे तं भिषक् परिवर्जयेत्॥13॥

Ca.I. – 6/13[22]

If the person is initially presented with swelling in the lower limbs and associated with extreme weakness of the calf muscles, treatment of such patient is better avoided.

शूनहस्तं शूनपादं शूनगुह्योदरं नरम्।
हीनवर्णबलाहारमौषधैर्नोपपादयेत्॥14॥

Ca.I. – 6/14[23]

If the person is having depletion in complexion, strength, capacity to take adequate food and he is presented with swelling in the hands, feet, perineum and abdomen, such a patient should not be given any medications.

हृष्टारोमा सान्द्रमूत्रः शूनः कासज्वरार्दितः।
क्षीणमांसो नरो दूराद्वर्ज्यो वैद्येन जानता॥16॥

Ca.I. – 6/16[24]

If the person is presented with horripulations, passes condensed urine, suffering from swelling, cough, fever and extreme loss of muscle from the body, then such a person is avoided for giving the treatment.

ज्वरातिसारौ शोफान्ते श्वयथुर्वा तयोः क्षये।
दुर्बलस्य विशेषेण नरस्यान्ताय जायते॥18॥

Ca.I. – 6/18[25]

If the person is presented with fever, diarrhoea and swelling at the end of the pathogenesis or vice versa and extremely weak, then such a person is going to die soon

कामलाऽक्ष्णोर्मुखं पूर्णं शङ्खयोर्मुक्तमांसता।
संत्रासश्चोष्णगात्रत्वं यस्य तं परिवर्जयेत्॥18॥

Ca.I. – 7/18[26]

If the person is presented with yellowish discolouration of the eyes, swelling in the face, temporal region, devoid of flesh, terrifying appearance and raised body temperature of the body, then such individuals are considered to be approaching death

उत्थाप्यमानः शयनात् प्रमोह याति यो नरः।
मुहुर्मुहुर्न सप्ताहं स जीवति विकत्थनः॥19॥

Ca.I. – 7/19[27]

If the person is presented with fainting frequently when he is getting up from the bed or being taken out of the bed, cannot survive even for a week

ऊर्ध्वे च यः प्रश्वसिति श्लेष्मणा चाभिभूयते।
हीनवर्णबलाहारो यो नरो न स जीवति॥26॥

Ca.I. – 7/26[28]

If the person is presented with inspiratory dyspnoea associated with appearance of sputum (*Kapha*), diminished complexion, strength and food intake is reduced, then such a person is not going to survive

घट्टयञ्जानुना जानु पादावुद्यम्य पातयन्।
योऽपास्यति मुहुर्वक्रमातुरो न स जीवति॥17॥

Ca.I. – 7/17[29]

If the person presents with complaints of striking one knee with another, throws down legs after lifting them up and frequently turns the face to one or other side, does not survive

मुहुर्हसन् मुहुः क्ष्वेडन् शय्यां पादेन हन्ति यः।
उच्चैश्छिद्राणि विमृशन्नातुरो न स जीवति॥20॥

Ca.I. – 7/20[30]

If the person frequently laughs and shouts, strikes the bed by feet and puts fingers into the nostrils, ears and eyes, does not survive

सहसा ज्वरसंतापस्तृष्णा मूर्च्छा बलक्षयः।
विश्लेषणं च सन्धीनां मुमूर्षोरुपजायते॥23॥ Ca.I. – 7/23[31]

If the patient presents with symptoms such as fever, thirst, fainting, diminution of strength and looseness of joints take place all of a sudden, then such patient succumbs to death

न्नोपैति कण्ठमाहारो जिह्वा कण्ठमुपैति च।
आयुष्यन्तं गते जन्तोर्बलं च परिहीयते॥25॥

Ca.I. – 8/25[32]

If the patient presents with symptoms such as ingested food not reaching the throat or tongue falls back over the throat, and there is diminution of strength, then the death of the person is imminent

सफेनं रुधिरं यस्य मुहुरास्यात् प्रसिच्यते।
शूलैश्च तुद्यते कुक्षिःप्रत्याख्येयस्यथाविधः॥21॥

Ca.I. – 9/21[33]

If the person is suffering from pain in upper or lower abdomen associated with vomiting of blood along with foam like appearance, then he should not be treated

Sadyo Marana **related** *Arishta*: As per *Chakrapani* in *Indriya Sthana*, the duration of *Sadyo Marana* is said to be 3 to 7 days.

वाताष्ठीला सुसंवृद्धा तिष्ठन्ति दारुणा हृदि।
तृष्णयाऽभिपरीतस्य सद्यो मुष्णाति जीवितम्॥4॥

Ca.I. – 10/4[34]

GK

20 This is usually seen in the patients suffering from chronic asmall or large intestinal obstruction
21 This set of clinical symptoms are seen in the patients of serious hepatic dysfunction. Any serious hepatic dysfunction will begin with oedema of peritoneal cavity.
22 This set of symptoms are seen in the patients suffering from serious compromise in cardiac function. This is usually followed by bilateral pedal oedema, further generalised oedema.
23 This set of symptoms are seen in the patients of hypoproteinemia. This leads to the transfer of more amount of proteins and fluid in extracellular space, further leading to anasarca
24 This set of symptoms are seen in the patients of hypovolemia.
25 This set of symptoms is seen in the patients suffering from malnutrition. One such major condition of malnutrition which is of much clinical significance is hypoproteinemia.
26 This set of symptoms are seen hepatic encephalopathy. In this condition, there will be brain damage caused by deposition of unconjugated bilirubin deposition in basal ganglia and brain stem nuclei. This may also be seen in the patients suffering from severe infections of hepatobiliary system
27 This set of clinical features are seen in the patients suffering from episodes of syncope. It usually results from insufficient blood supply to cerebral hemisphere. It usually results from reduced cardiac output.

GK

28 When the person is presented with inspiratory dyspnoea, it indicates the disease of upper respiratory passages. When the person is suffering from serious disease of upper respiratory passage it is usually associated with presence of stridor. This sign will be observed in the patients of laryngeal or tracheal obstruction.
29 This set of symptoms can be seen in hemiballismus. This is caused by a lesion around contralateral subthalamic nucleus which is usually caused by infarct of that particular area.
30 This set of symptoms are seen chorea-athetosis in the patients of lesions of basal ganglia. Some other causes of chorea-athetotic movements are thyrotoxicosis, paraneoplastic syndromes, systemic lupus erythematosus.
31 This set of symptoms are seen in the patients of hypovolemic shock. This is seen following fluid loss due to raised body temperature and no proper fluid supplementation is being carried out.
32 This set of clinical symptoms indicate obstructive pathology of upper alimentary canal wherein voluntary phase of dysphagia will be present in the patient. This may be seen in the patients of oral malignancy or in bulbar palsy.
33 This set of symptoms indicate upper gastrointestinal haemorrhage either in the oesophagus or stomach. In case of oesophageal hemorrhage, the patient may present with vomiting of frank blood and malena and in case of gastrogenic hematemesis, the person will be presented with coffee ground vomiting and malena.
34 This type of clinical presentation is seen aortic aneurysm of ascending aorta, where there will be erosion of sternum. In case of rupture of aneurysm, he may present with hemoptysis or haemetemesis depending upon the site of rupture into respiratory or gastro intestinal passage.

When a person presents with pain and fully manifested *Vatashthila* (hard tumour caused by vitiated *Vata*) in the cardiac region, he will leave the world immediately

भ्रुवौ यस्य च्युते स्थानादन्तर्दाहश्च दारुणः।
तस्य हिक्काकरो रोगः सद्यो मुष्णाति जीवितम्॥6॥

Ca.I. – 10/6[35]

Development of hiccup in a patient who has drooping of the eyebrows and excess burning sensation inside the body, then such individual will die immediately

Some other signs indicating Arishta

शरीरकम्पः संमोहो गतिर्वचनमेव च।
मत्तस्येवोपलभ्यन्ते यस्य मासं न जीवति॥10॥

Ca.I. – 11/10[36]

If the person is presented with tremors of the body, stupor or altered state of consciousness, gait and speech of the individual resembles to that of the intoxicated individual, then such individual cannot survive for one month

हस्तपादं मुखं चोभे विशेषाद्यस्य शुष्यतः।
शूयेते वा विना देहात् स च मासं न जीवति॥12॥

Ca.I. – 11/12[37]

If the person is having either emaciation or swelling of the hands, feet and face of the individual with the body without showing similar changes, then such individual does not survive for one month

ग्रीवावमर्दो बलवाञ्जिह्वाश्वयथुरेव च।
ब्रध्नास्यगलपाकश्च यस्य पक्षं तमादिशेत्॥15॥

Ca.I. – 11/15[38]

If the person is having acute squeezing type of pain in the neck, swelling of the tongue, swelling in the inguinal region, inflammatory changes in the mouth and throat should be considered to be nearing to the death

यस्य गोमयचूर्णाभं चूर्णं मूर्धनि जायते।
शस्नेहं भ्रश्यते चैव मासान्तं तस्य जीवितम्॥3॥

Ca.I. – 12/3

If an unctuous powder resembling that of cow dung[39] appears in and falls down from the head, the patient may live for the period of one month

यस्य स्नातानुलिप्तस्य पूर्वे शुष्यत्युरो भृशम्।
आर्द्रेषु सर्वगात्रेषु सोऽर्धमांसं न जीवति॥5॥

Ca.I. – 12/5

⇨ If after bath or application of unction, the chest gets dried up while rest of the body remains wet,[40] the individual does not survive for more than fortnight

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[35] This group of clinical symptoms indicate the irritation of medullary centres that control the respiratory muscles, diaphragm in particular. Drooping of eyebrows is seen in 3rd cranial nerve palsy and excess burning sensation can be observed in involvement of peripheral nerves. This type of clinical pattern is seen in the patients of multiple sclerosis.

[36] This group of clinical symptoms indicate the involvement of major part of the brain – cerebral hemisphere as well as cerebellar involvement. Tremors, gait and speech similar to the speech of intoxicated individual suggest the cerebellar involvement and stupor or altered state of consciousness may imply the cerebral involvement, cerebral oedema in particular.

[37] This kind of clinical presentation where emaciation or swelling of hand, feet and face of the individual on one side, may suggest the diagnosis of cerebro vascular accident, where in other side of the body is not showing similar clinical features.

[38] If we analyse most of the symptoms mentioned in this group of *Arishta Lakshana* indicate the abnormalities in gastro intestinal tract. That means involvement of mouth and surrounding structures, small or large intestine can be predicted. Acute squeezing type of pain in the neck can also be attributable to gastro intestinal dysfunction.

[39] This kind of the sign can be seen when the person is having multiple ulcers in the scalp region. In this situation, the cerebrospinal fluid (CSF) will mix with the injured tissue of the scalp. The probable infection inside the head can be predicted.

[40] This is probably indicating the generalised oedema of the body (anasarca).

Arishta Lakshana related to Duta (messenger)[41]

मुक्तकेशेऽथवा नग्ने रुदत्यप्रयतेऽथवा।
भिषगभ्यागतं दृष्ट्वा दूतं मरणमादिशेत्॥10॥
सुप्ते भिषजि ये दूताश्छिन्दत्यपि च भिन्दति।
आगच्छन्ति भिषक् तेषां न भर्तारमनुव्रजेत्॥11॥
झुह्वत्यग्निं तथा पिण्डान् पितृभ्यो निर्वपत्यपि।
वैद्ये दूता य आयान्ति ते घ्नन्ति प्रजिघांसवः॥12॥
कथयत्यप्रशस्तानि चिन्तयत्यथवा पुनः।
वैद्ये दूता मनुष्याणामागच्छन्ति मुमूर्षताम्॥13॥
णृतदग्धविनष्टाानि भजति व्याहरत्यपि।
अप्रशस्तानि चान्यानि वैद्ये दूता मुमूर्षताम्॥14॥
विकारसामान्यगुणे देशे कालेऽथवा भिषृक्।
दूतमभ्यागतं दृष्टवा नातुरं तमुपाचरेत्॥15॥
दीनभीतद्रुतत्रस्तमलिनामसतीं स्त्रियम्।
त्रीन् व्याकृतींश्च षण्डांश्च दूतान् विद्यान्ममूर्षताम्॥16॥
अङ्गव्यसनिनं दूतं लिङ्गिनं व्याधितं तथा।
संप्रेक्ष्य चोग्रकर्माणिं न वैद्यो गन्तुमर्हति॥17॥
आतुरार्थमनुप्राप्तं खरोष्ट्ररथवाहनम्।
धूतं दृष्टा भिषग्विद्यादातुरस्य पराभवम्॥18॥
पलालबुसमांसास्थिकेशलोमनखद्विजान्।
मार्जनी मुसलं शूर्पमुपानच्चर्म विच्युतम्॥19॥
तृणकाष्ठतुषाङ्गारं स्पृशन्तो लोष्टमश्म च।
तत्पूर्वदर्शने दूता व्याहरन्ति मुमूर्षताम्॥20॥
यस्मिंश्च दूते ब्रुवति वाक्यमातुरसंश्रयम्।
पश्येन्निंमित्तमशुभं तं च नानुव्रजेद्भिषक्॥21॥
तथा व्यसनिनं प्रेतं प्रेतालङ्कारमेव वा।
भिन्नं दग्धं विनष्टां वा तद्वादीनि वचांसि वा॥22॥
रसो वा कटुकस्तीव्रो गन्धो वा कौणपो महान्।
स्पर्शो वा विपुलः क्रूरोयद्वाऽन्यदशुभं भवेत्॥23॥
तत्पूर्वमभितो वाक्यं वाक्यकालेऽथवा पुनः।
दूतानां व्याहृतं श्रुत्वा धीरोमरणामादिशेत्॥24॥
इति दूधातिकारोऽमुक्तो कृत्स्नो मुमूर्तषाम्॥

Ca.I. – 12/10-25

⇨ If the messenger arrives at the physician's house when the latter is dishevelled, naked, crying or unclean, the patient should be considered as moribund

⇨ If the messenger arrives at the physician's house when the latter is asleep or cutting or splitting something, the physician should not accompany him to the patient

⇨ If the messenger arrives at the physician's house, when the latter is offering oblations to the fire or *Pinda* (balls of food) to the manes, then the patient for whom the messenger was sent succumbs to death

⇨ If the messenger arrives while the

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[41] While discussing about this topic, we should know about the fundamentals of communication happening around us in the society.
When we talk about communication, 7% of the communication happens as verbal communication and 93% of the communication happens as non verbal communication. The term non verbal communication includes tone of voice, position of our head, hand, foot and any part of the body. This can be studied under the concept of body language. This is not always within the complete control of oneself.
Few examples I will mention here to predict the status of the accompanying person and this can be applied while analysing the situation of the messenger.
Biting one's nails indicates the messenger is in insecurity or nervousness
Rubbing one's eyes indicates that the messenger is in doubt or disbelief
Arms crossed on the chest indicates that the messenger is having a posture of defensiveness
Hands inside one's pocket indicates the person is having a suspicion attitude
Sitting in a chair shaking one of the legs means the person is feeling nervous and uncomfortable
Rubbing or touching his/her nose when answering a question indicates he is not telling the complete truth
In case of eye movements of an individual, there will be either contraction or relaxation of pupil during communication. When one is excited, his pupils are dilated upto four times their normal size. When the person is under anger, depression or frustration, there will be contraction of pupil.
Apart from the body language, there are certain other methods of communication analysis were emerged the field of psychotherapy. They are gestalt therapy and transactional analysis. Both these approaches helps the clinician regarding the psychological status of an individual at that particular point of time.

physician is thinking or speaking of dead, burnt or destroyed things or such other inauspicious substances, then the patient should be considered as moribund

- If the messenger arrives at the physician's house which have attributes similar to those of the disease from which the patient is suffering, then he should be considered to be moribund
- If the patient is suffering from *Raktapitta* (bleeding disorders) and the messenger sent by the patient arrives the physician's house, when fire is burning nearby or during mid-day, both of which have attributes similar to those of *Raktapitta*, the patient is sure to die
- If the messenger is in miserable condition, frightened, hurried, terrified and unclean or if the messenger happens to be a woman who is without chastity or if they are three in number or if he has deformed organs or if the messenger is an eunuch, the patient for whom such a messenger is sent is to be considered as moribund
- If the messenger is deficient in any organ of his body, if he is an ascetic or himself suffering from diseases or if he indulges in cruel activities, the physician should not attend the patient for whom such a messenger has come
- If the messenger comes in a vehicle carried by donkey or camel, the patient by whom he has been sent succumbs to death
- When the physician sees the messenger for the first time, if the latter be touching either straw, chaff, flesh, bone, hair of the head or body hairs, nails, teeth, leather pieces from shoes, husk, charcoal, stone, the patient for whom the messenger is sent, should be considered as moribund
- If the physician sees bad omens while the messenger describes the condition of the patient, he should not accompany such a messenger to the patient's house, i.e. such an incident indicates imminent death of the patient. Similarly if the physician comes across a sorrowful person, dead body, he should not attend the patient
- If the physician comes across the vision of something cut, burnt and destroyed or the sound of statements describing such incidents or tastes which are pungent or smell which is exceedingly stincky lke that of carpse or touch of things which are exceedingly harsh or such other sensory objects which are considered inauspicious, immediately before or during the receipt of the message or after hearing the call of the messenger, the patient for whom the messenger is sent should be considered as nearing death

***Arishta Lakshana* observed by the physician on the way to patient's house:** The following are the incidents observed by the physician on the way to patient's home indicate the imminent signs of death. They are

पथ्यातुरकुलानां च वक्ष्याम्यौत्पातिकं पुनः।25॥
अवक्षुतमथोत्कुष्टं स्खलनं पतनं तथा॥
आक्रोशः संप्रहारो वा प्रतिषेधो विगर्हणम्॥26॥
वस्त्रोष्णीषोत्तरासङ्गश्छत्रोपानद्युगाश्रयम्।
व्यसनं दर्शनं चापि मृतव्यसनिनां तथा॥27॥
चैत्यध्वजपताकानां पूर्णानां पतनानि च।
त्तानिष्टप्रवादाश्च दूषणं भस्मपांशुभिः॥28॥
पथच्छेदो विडालेन शुना सर्पेण वा पुनः।
मृगद्विजानां क्रूराणां गिरो दीप्तां दिशं प्रत॥29॥
शयनासनयानानामुत्तानां च दर्शनम्।
इत्येतान्यप्रशस्तानि सर्वाण्याहुर्मनीषिणः॥30॥
एतानि पथि वैद्येन पश्यताऽऽतुरवेश्मनि।
शृण्वता च ान गन्तव्यं तदागारं विपश्चिता॥31॥
इत्यौत्पातिकमाख्यातं पथि वैद्यविगर्हितम्।

Ca.I. – 12/25-32

- Sneezing, crying out of fear, stumbling, falling, *Akrosha* (crying out of disappointment), beating, *Pratishedha* (prevention from going), reviling, attachment of cloth, turban, upper garment in a thorny plant, tearing of the cloth of umbrella or pair of shoes, vision of dead persons or persons having deformity of organs; falling of *Chaitya* (religious fig tree), flag staff, flag or *Purnakumbha* (pitcher full of water), arrival of information regarding death or other inauspicious things; pollution by ashes or dust; *Pathacheda* (crossing of the road in front of the physician) by the cat, dog or snake; cries of cruel animals like jackals and vultures from the direction of *Dipta* (in which sun is present or south direction); vision of beds, seats, vessels which are turned upside down. All above signs are considered as inauspicious by the wise people.

Arishta Lakshana observed by the physician while entering or inside the patient's house

इमामपि च बुध्येत गृहावस्थां मुमूर्षताम्॥32॥
प्रवेशे पूर्णकुम्भाग्निमृद्बीजफलसर्पिषाम्।
वृषब्राह्मणरत्नान्नदेवतानां च निर्गतिम्॥33॥
अग्निपूर्णानि पात्राणि भिन्नानि विशिखानि च।
भिषङ् मुमूर्षतां वेश्म प्रविशन्नेव पश्यति॥34॥
छिन्नभिन्नानि दग्धानि भग्नानि मृदितानि च।
दुर्बलानि च सेवन्ते मुमूर्षोर्वैश्मिका जनाः।35॥
शयनं वसनं यानं गमनं भोजनं रुतम्।
श्रूयतेऽमङ्गलं यस्य नास्ति तस्य चिकित्सितम्॥36॥
शयनं वसनं यानं गमनं भोजनं रुतम्।
श्रूयतेऽमङ्गलं यस्य नास्ति तस्य चिकित्सितम्॥37॥
अन्नं व्यापद्यतेऽत्यर्थे ज्योतिश्चैवोपशाम्यति।
निवाते सेन्धनं यस्य तस्य नास्ति चिकित्सितम्॥38॥
आतुरस्य गृहे यस्य भिद्यन्ते वा पतन्ति वा।
अतिमात्रममत्राणि दुर्लभं तस्य जीवितम्॥39॥

Ca.I. – 12/32-39

- At the time of entrance into the house of the moribund patient, the physician will observe the existence of *Purnakumbha* (pitcher full of water), fire, earth, seeds, fruits, ghee, a bull, a *Brahmin*, precious stones, prepared food and idols of Gods
- Inside such a patient's house, he may see the vessels of fire which are either broken or with the flame extinguished
- Things that are broken, cracked, burnt, split or crushed are used by important persons residing in the house of the moribund patient
- The patient whose bed, cloth, vehicle, gait, food and voice bears inauspiciousness should not be treated
- If the relatives of the patient arrange for his bed, cloth, vehicle and other apparel which are befitting for dead bodies, then the patient should be considered as already dead
- If the food for a patient becomes exceedingly rotten and the fire for him gets extinguished even it is supplied with fuel in adequate quantity and there is n owind, then no treatment will succeed in curing the patient
- If saucers and plates often fall down and get broken in the house of a patient, then his life can hardly be saved.

Arishta Lakshana observed by the physician on the body of the patient

प्राणाः समुपतप्यन्ते विज्ञानमुपरुध्यते।
वमन्ति बलमङ्गानि चेष्टा व्युपरमन्ति च॥46॥
इन्द्रियाणि विनश्यन्ति खिलीभवति चेतना।
औत्सुक्यं भजते सत्त्वं चेतो भीराविशत्यपि॥47॥
श्मृतिस्त्यजति मेधा च ह्रीश्रियौ चापसर्पतः।
उपप्लवन्ते पाप्मान ओजस्तेजश्च नश्यति॥48॥
शीलं व्यावर्ततेऽत्यर्थं भक्तिश्च परिवर्तते।
विक्रियन्ते प्रतिच्छायाश्छायाश्च विकृतिं प्रति॥49॥
शुक्र प्रच्यवते स्थानदुन्मार्गं भजतेऽनिलः।
क्षयं मांसानि गच्छन्ति गच्छत्यसृगपि क्षयम्॥50॥
ऊष्माणः प्रलयं यान्ति विश्लेषं यान्ति सन्धसयः।
गन्धा विकृतिमायान्ति भेदं वर्णस्वरौ तथा॥51॥
वैवर्ण्यं भजते कायः कायच्छिद्रं विशुष्यति।
धूमः संजायते मूर्ध्नि दारुणाख्यश्च चूर्णकः॥52॥
शततस्पन्दना देशाः शरीरे येऽभिलक्षिताः।
थे स्तम्भानुगताः सर्वे न चलन्ति कथंचन॥53॥
गुणाः शरीरदेशानां शीतोष्णमृदुदारुणाः।
विपर्यासेन वर्तन्ते स्थानेष्वन्येषु तद्विधाः॥54॥
नखेषु जायते पुष्पं पङ्को दन्तेषु जायते।
जटाः पक्ष्मसु जायन्ते सीमन्ताश्चापि मूर्धनि॥55॥
भेषजानि न संवृत्तिं प्राप्नुवन्ति यथारुचि।
यानि पाप्युपपद्यन्ते तेषां वीर्यं न सिध्यति॥56॥

नानाप्रकृतयः क्रूरा विकारा विविधौषधाः।
क्षिप्रं समभिवर्तन्ते प्रतिहत्य बलौजसी॥57॥
शब्दः स्पर्शो रसो रूपं गन्धश्चेष्टा विचिन्तितम्।
उत्पद्यन्तेऽशुभान्येव प्रतिकर्मप्रवृत्तिषु॥58॥
दृश्यन्ते दारुणाः स्वप्ना दौरात्म्यमुपजायते।
प्रेष्याः प्रतीपतां यान्ति प्रेताकृतिरुदीर्यते॥59॥
प्रकृतिर्हीयतेऽत्यर्थं विकृतिश्चाभिवर्धते।
कृत्स्नमौत्पातिकं घोरमरि (नि) ष्टमुपलक्ष्यते॥60॥
इत्येतानि मनुष्याणां भवन्ति विनशिष्यताम्।
ळाक्षणानि यथोद्देशं यान्युक्तानि यथागमम्॥61॥
Ca.I. – 12/46-61

The above said are the features observed in the patient's body while he is approaching death.

- Affliction of *Prana* (vital breath)
- Clouding of understanding
- Drainage of strength from limbs
- Cessation of movements
- Destruction of sensory faculties
- Impairment of consciousness
- Restlessness in mind
- Affliction of mind with fear
- Deprivation of memory, intellect, *Hri* (natural modesty), *Sri* (lustre) of the body
- Aggravation of *Papma* (diseases caused by sinful acts)
- Destruction of Ojas and complexion
- Radical change in the conduct
- Change in likings
- Perversion in the reflected image and lustre of the individual
- Expulsion of semen from its normal site
- Wasting of muscle tissue and blood
- Diminution of *Ushma* (factors responsible for production of heat including digestion and metabolism)
- Dislocation of joint
- Morbid change in the smells of the body
- Hoarseness of voice and impairment of complexion
- Discolouration of the body
- Dryness of orifices of the body
- Appearance of smoke in the head
- Appearance of a substance like the powder of cow dung in the head
- Complete cessation of pulsation in the parts of the body which pulsate constantly in normal conditions
- Manifestation of attributes of opposite nature in those parts of the body which are either cold, hot soft or rough and similar other features
- Appearance of *Pushpa* (white spots) in nails and adherence of mud like substance in teeth
- Matting of eyelashes and manifestation of *Simanta* (line caused by the parting of hair) in the head
- Difficulty in obtaining the desired drugs and even if such drugs are obtained, their actions are not manifested in consonant with their potency
- Sudden manifestation of serious diseases of diverse types and requiring different types of treatment by over powering strength and Ojas (power of resistance to disease and decay)
- Manifestation of inauspicious sound, touch, taste, vision, smell, action and though in the physician while treating such patients
- Appearance of cruel dreams and manifestation of evil disposition for the patient
- Hostility of the messenger and change in complexion to that of a dead person
- Diminution of normal characteristic features of the body and aggravation of the morbid conditions

Good prognostic signs observed by the physicians by seeing the messengers

स्वचारं हृष्टमव्यङ्गं यशस्यं शुक्लवाससम्।

अमुण्डमजटं दूतं जातिवेशक्रियासमम्॥67॥
अनुष्ट्रखरयानस्थमसन्ध्यास्वग्रहेषु च।
अदारुणेषु नक्षत्रेष्वनुग्रेषु ध्रुवेषु च॥68॥
विना चतुर्थी नवमीं विना रिक्तां चतुर्दशीम्।
मध्याह्नमर्धरात्रं च भूकम्पं राहुदर्शनम्॥69॥
विना देशमशस्तं चाशस्तौत्पातिकलक्षणम्।
दूतं प्रशस्तमव्यग्रं निर्दिशेदागतं भिषक्॥70॥
Ca.I. – 12/67-70

- Who is with good conduct and pleasant behaviour
- Who is not devoid of any organ of his body
- Who is of repute and clad with white clothes
- Who is not completely shaved (having a *Shikha* or tuft of hair in the crown of the head) and whose hair is not matted
- Who is similar in caste, dress, and action
- Who has not come in a vehicle carried by camel or donkey
- Who has not come at the time of *Sandhya* (morning or evening twilight)
- Who has come at a time when the cruel planets are not situated in the inauspicious houses of the zodiac
- Who has come at a time, when the *Uttaraphalguni*, *Uttarashadha* and *Uttara Bhadrapadi* and *Rohini* are considered as auspicious and on auspicious *Tithi* barring 4th, 9th and 14th days of a *Paksha* (lunar fortnight)
- Who has come to a place which is not defamed and which is devoid of inauspicious characteristics
- Who is not perturbed

Good prognostic signs on the way to the patient's home

दध्यक्षतद्विजातीनां वृषभाणां नृपस्य च॥71॥
रत्नानां पूर्णकुम्भानां सितस्य तुरगस्य च।
सुरध्वजपताकानां फलानां यावकस्य च॥72॥
कन्यापुंवर्धमानानां बद्धस्यैकपशोस्तस्था।
पृथिव्या उद्धतायाश्च वह्नेः प्रज्वलितस्य च॥73॥
मोदकानां सुमनसां शुक्लानां चन्दनस्य च।
मनोज्ञस्यान्नपानस्य पूर्णस्य शकटस्य च॥74॥
नृभिर्धेन्वाः सवत्साया वडवायाः स्त्रियास्तथा।
जीवञ्जीवकसिद्धार्थसारसप्रियवादिनाम्॥75॥
हंसानां शतपत्राणां चाषाणां शिखिनां तथा।
मत्स्याजद्विजशङ्खानां प्रियङ्गूनां घृतस्य च॥76॥
रुचकादर्शसिद्धार्थरोचनानां च दर्शनम्।
गन्धः सुरभिर्वर्णश्च सुशुक्लो मधुरो रसः॥77॥
मृगपक्षिमनुष्याणां प्रशस्ताश्च गिरः शुभाः।
छत्रध्वजपताकानामुत्क्षेपणमभिष्टुतिः॥78॥
भेरीमृदङ्गशङ्खानां शब्दाः पुण्याहनिस्वपनाः।
वेदाध्ययनशब्दाश्च सुखो वायुः प्रदक्षिणः॥79॥
पथि वेश्मप्रवेशे तु विद्यादारोग्यलक्षणम्। Ca.I. – 12/71-80

The above incidents are indicating good prognosis while entering the patient's house.

- Curd
- *Akshata* (grains of intact rice)
- *Brahmana*
- Bulls
- King
- Gems
- Pitches full of water
- White horse
- Flags and banners dedicated to Indra
- Fruits
- Grains of barley
- Boys and girls seated on the lap or boys, girls and earthen plate
- An animal of good breed tied to a rope
- Cultivated land
- Kindled fire
- Sweets
- White coloured flower
- Sandal paste
- Delicious food articles and drinks
- A cart fully loaded with human beings
- A cow together with a calf

- A mare with her calf
- A woman with her child
- *Chakora* (cukor)
- *Saarasa* (crane)
- Sparrow
- Swan
- *Shatapatra* (parrot)
- Peacock
- Fish
- Goat
- Elephant tusk
- *Priyangu* (Callicarpa macrophyla)
- Ghee
- *Ruchaka* (ornaments of horses)
- Mirror
- White mustard
- *Gorochana* (bile of cow)
- Fragrance
- White complexion
- Sweet taste
- Sweet and auspicious voices of animals, birds and human beings
- Unfolding of umbrellas, flags and banners
- Prayers
- Sound of cattle, drums, and conches
- *Punyaha* (auspicious sounds)
- Sounds of *Vedic* recitations and soothing wind from south direction

Importance of Arishta

मिथ्यादृष्टमरिष्टाभमनरिष्टमजानता।
अरिष्टं वाऽप्यसंबुद्धमेतत् प्रज्ञापराधजम्।।6।। Ca.I. – 2/6

An ignorant person sometimes wrongly views symptoms and misinterpret as symptoms of death. Sometimes, the real symptoms indicating the signs of death can be ignored as mild symptoms of ill health. Both these situations are considered to be inappropriate. In the former situation, undue attention will be given to the patient and in the latter situation, the life of the person will be in danger.

Relevance of Arishta in current era

- Let us take the example of abnormal discolouration i.e. *Vaikrita Varna*. In the literature, one such abnormal colour *Nila* (blue) is mentioned. As per the western medicine, bluish discolouration is specifically seen in major cardio respiratory diseases. Let us take another discolouration i.e. *Shyava* (blackish discolouration) which is seen in the conditions where there is lack of blood supply in the lower limbs i.e. peripheral arterial disease.
- Let us take the abnormal voice i.e. *Kapota Svara* (sound mimics the sound produced by pigeon) which is specifically seen in either laryngeal or tracheal obstruction. This is called as stridor.
- Let us take another example of *Satatam Spandamananam Sharira deshanam Aspandanam* – absence of pulsation of the parts of the body where continuous pulsation of the parts are observed, for example in case of peripheral arterial disease in the lower limbs, we may get absence of pulsations in dorsalis pedis artery or posterior tibial artery etc.
- Let us take the example of *Duta* or messenger. Whenever, wise clinician wants to interpret the findings based on *Duta*, he should be well versed in understanding the signs of body language. This is considered under the communication skills. Whenever, we speak of communication skills, every single second of a day, we will communicate to other people one or the other information. Albert Mehrabian of UCLA, a noted researcher concluded that there are three components of any spoken language, the words, tone of voice and body language. Words comprises only 7% of the total communication; 38% of the communication is through tone of the voice and 55% of the communication is done through body language. These conclusions help us to conclude that simply words does not mean communication. This is only part of the communication which is termed as verbal communication. 93% of the communication is coming under the category of non verbal communication.
  - ☐ To state an example for the importance, whenever we speak to other people, we are usually have adequate eye contact. When we are having eye contact and if we observe the constriction of pupils, then we may conclude that the other person is not interested in your speech and if you observe the dilatation of the pupils during conversation, we can conclude that the person to whom you are having conversation, is interested in your speech.
  - ☐ When a person is in a state of joy, the person will never have a face down and the person is a sorry state, he will never have a face up. This is the natural tendency of human behaviour.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya excerpts
2. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers medical publishers, New Delhi, 2005
3. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th Edition, Saunders publication, 2006
4. Body language – your success mantra by Dr Shalini Verma, 1st Edition, reprint, S Chand & Company Ltd, New Delhi, 2008
5. Law relating to medical negligence by Y V Rao, 2nd Edition, Asian Law House, Hyderabad, 2010

Key points of the chapter

- नियतमरणख्यापकं लिङ्गमरिष्ट Ma.Ni. – 1/3, Madhu
- क्रियापथमतिक्रान्ताः केवलं देहमाप्लुताः। चिह्नं कुर्वन्ति यद्दोषास्तदरिष्टं निरुच्यते।। Ca.I. – 11/29 The above two definitions describe the concept of Arishta very well. First definition says Arishta is imminent sign of death. The second definition says Arishta Lakshana are observed in the body and is beyond the purview of treatment.
- As far as types of Arishta are concerned, 2 types of Arishta–

(a) Niyata

(b) Aniyata;

2 types– Sthayi and Asthayi;

2 types– Purusha Ashrita and Purusha Anashrita. In Purusha Ashrita, two types – Prakritiah and Vikritiah. Prakritiah Purusha Ashrita Arishta are 6 types – Jatiprasakta, Kulaprasakta, Desha Anupatini, Kalanupatini, Vayo Anupatini and Pratyatma Niyata. Vikritiah Purusha Ashrita Arishta are of 3 types – Lakshana Nimitta, Lakshya Nimitta and Nimitta Anurupa.

- In Charaka Samhita, nearly 47 factors of Arishta assessment are mentioned.

Probable questions may be asked in the examination

Long essays

- ➩ Describe Arishta in detail with its present application.

Short essays

- ➩ Define Arishta and explain the types of Arishta
- ➩ Arishta Lakshana
- ➩ Significance of Arishta
- ➩ Define Arishta and classify
- ➩ Define Arishta and its synonyms
- ➩ Define Arishta Lakshana and explain Duta Arishta
- ➩ Arishta

Short answers

- ➩ Arishta Lakshana
- ➩ Prakrita and Vaikrita Varna
- ➩ Lakshana Nimitta Arishta
- ➩ Define Arishta
- ➩ Duta Arishta
- ➩ Svapnarishta
- ➩ Arishta Paribhasha
- ➩ Enumerate the types of Arishta

MCQs

1. **Arishta Lakshana are observed in ------------ stage of Kriyakala.**
   a. Sanchaya;
   b. Bheda;
   c. Vyakta;
   d. Prakopa
2. **Arishta Lakshana manifested due to supra human power (Daiva as a cause) is categorized under**
   a. Lakshana Nimitta;
   b. Lakshya Nimitta;
   c. Nimitta Anurupa;
   d. None of the above
   Answer -(a)
3. **Number of Prakrita Varna as per Charaka**
   a. 3;
   b. 4;
   c. 5;
   d. 6
   Answer -(b)
4. **Which of the following is not considered as Prakrita Svara?**
   a. Hamsa;
   b. Nemi;
   c. Kapota;
   d. Edaka
   Answer -(d)
5. **Find the one which does not belong to one group.**
   a. Krishna;
   b. Avadata;
   c. Shyama;
   d. Shyava
   Answer -(d)

***

Sadhyasadhyatva of Diseases

11

Learning objectives

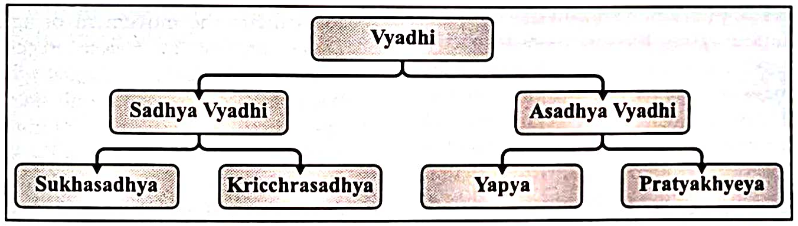
- ➩ The criteria used for the assessment of Sadhyasadhyata of any illness
- ➩ Application of criteria of Sadhyasadhyata of an illness
- ➩ To plan the line of management or treatment

1.1 Criteria for the assessment of Sadhyasadhyata of an illness

The word '*Sadhyasadhyata*' comprises of two words – *Sadhya* and *Asadhya* which refers to curability and incurability of any illness. As per *Ayurvedic* literature, the curability and incurability of any illness depends upon several factors. Degree of vitiation of *Dosha*, involvement of *Dushya*, duration of the illness, age of the patient, gender of the patient, involvement of the body parts in the disease manifestation and progression, presence or absence of *Upadrava*, involvement of *Rogamarga*, nature of treatment etc will decide the curability or incurability of the illness. In the coming pages, we are going to discuss these criteria in detail.

Diseases are classified based on the concept of *Sadhyasadhyata* into two – (a) *Sadhya* and (b) *Asadhya Vyadhis*. *Sadhya Vyadhis* are again classified into *Sukhasadhya Vikara* and *Kricchra Sadhya Vikaras*. *Asadhya vikaras* are classified into *Yapya* and *Pratyakhyeya Vikaras*. The clinician should analyse all the below said details and decide *Sadhyasadhyata* of any illness.

***Sukhasadhya Vikaras*:** The word *Sukhasadhya Vikara* refers to the diseases which are easily curable with little or no effort. The following are the characters of *Sukhasadhya Vikara*.



Flowchart 11.1: of Sadhyasadhyata of diseases

हेतवः पूर्वरूपाणि रूपाण्यल्पानि यस्य च।
न च तुल्यगुणो दूष्यो न दोषः प्रकृतिर्भवेत्॥11॥
न च कालगुणस्तुल्यो न देशो दुरुपक्रमः।
गतिरेका नवत्वं च रोगस्योपद्रवो न च॥12॥
दोषश्चैकः समुत्पत्तौ देहः सर्वौषधक्षमः।
चतुष्पादोपपत्तिश्च सुखसाध्यस्य लक्षणम्॥13॥

Sukhasadhya Vyadhi Lakshana, Ca.Su. – 10/11-13

- ➩ If the *Hetu* (causative factors), *Purvarupa* (pre monitory symptoms) and *Rupa* (clinical features) are of mild in nature. For example, let us take the example of causative factors, when two people are exposed to dust, one individual is exposed to dust for 3 months for a period of 2 hours per day and another individual is exposed to dust for a period of 6 months for a period of 2 hours per day, former individual is having mild form of exposure to *Hetu* (etiological factor) and latter individual is having moderate to severe form of exposure to etiological factor when compared to former individual. The reason could be in the former individual, the vitiation of *Dosha* will be mild and in the latter individual, the degree of vitiation of *Dosha* will be much more severe.

☐ Let us discuss with another example, in the person suffering from *Kushtha* (skin disease) localised to one particular body will have mild form of the disease when compared to the individual suffering from similar kind of illness involving skin present all over the body.

⇨ **If the vitiated *Dosha* and involved *Dushya*[1] are not having similar qualities–** for example, if an individual consumes *Ghrita* (ghee), that is responsible for the increase of *Snigdha* (unctuousness) *Guna* in the body. This quality is present in *Kapha Dosha* and *Pitta Dosha* to a lesser extent, and among *Dhatus, Rasa, Mamsa, Meda, Majja* and *Shukra*, means there is a possibility of increase of either *Kapha* or *Pitta* and other said *Dhatu* in the body. If the clinician gives the treatment to pacify enhanced unctuousness in the body, that may have an impact not only for vitiated *Dosha*, that may lead to the reduction in all *Dhatu* associated with unctuousness which may be normal sometimes. Thus, it will worsen the situation of the individual.

⇨ **If the vitiated *Dosha* is not the *Prakriti* of that individual –** for example, when the person is of *Pitta Prakriti* and he should not suffer from diseases occurring due to *Pitta* vitiation. The reason is in such situation, we may require much more potent medications to restore the balance of *Dosha*.

⇨ **If the season and vitiated *Dosha* are not having similar qualities –** this is related to the seasonal variations. For example, in the month of October, it is usually dominance of *Pitta* takes place normally. In this season, the person should not suffer from diseases manifested due to *Pitta Dosha*. In this situation, the clinician requires much more stronger medicines to pacify the vitiated *Dosha*.

⇨ **If the involved body part is easily approachable by the clinicians –** that means either the affected body part should be visible or deeper organs should not be involved in the disease process or private parts should not be involved as most of the people will be reluctant to consult the clinicians in this regard.

⇨ **If only one *Rogamarga* is involved –** when the person is having involvement of one *Rogamarga* it is easy to manage. For example, when the person is presented with itching, discolouration of the skin without the involvement of alimentary canal dysfunction or involvement of *Marma*, bones and joints, ideal line of treatment is to facilitate the movement of aggravated *Dosha* present in *Shakha Rogamarga* to *Koshtha* (*Abhyantara*) *Rogamarga*. When the person is presented with skin disease, associated with multiple joint involvement (indicative of *Bahya* and *Madhyama Rogamarga* involvement), the management is bit difficult when compared to former situation.

⇨ **If the disease is of recent onset or shorter duration**

GK

1 ज्वरे तुल्यर्तुदोषत्वं प्रमेहे तुल्यदूष्यता।
रक्तगुल्मे पुराणत्वं सुखसाध्यस्य लक्षणम्।। चक्र, च.सू. - 10/11-13

In case of *Jvara*, vitiation of *Dosha* and season; in case of *Prameha*, vitiation of *Dosha* and *Dushya* and in case of *Raktagulma*, chronicity of the illness are considered as characteristic features of easily curable disease.

⇨ **If the *Upadravas* of any disease are not present in that individual –** as we discussed earlier, *Upadravas* usually afflict the same *Srotas* or nearby *Srotas*. This implies that the person is having less physical strength than the virulence of the disease.

⇨ **If only one *Dosha* is vitiated -**

⇨ If the body of diseased individual can sustain the potency of any medicine (physical strength of the individual is high)

⇨ If the *Chikitsa Chatuspada* is present (*Bhishak, Dravya, Paricharaka* and *Rogi*)

Kricchrasadhya Vikaras: *Kricchrasadhya Vikara* refers to the diseases which require extra effort to have the complete remission of the disease.

निमित्तपूर्वरूपाणां रूपाणां मध्यमे बले।
कालप्रकृतिदूष्याणां सामान्येऽन्यतमस्य च॥14॥
गर्भिणीवृद्धबालानां नात्युपद्रवपीडितम्।
शस्त्रक्षाराग्निकृत्यानामनवं कृच्छ्रदेशजम्॥15॥
विद्यादेकपथं रोगं नातिपूर्णचतुष्पदम्।
द्विपथं नातिकालं वा कृच्छ्रसाध्यं द्विदोषजम्॥16॥
Kricchrasadhya Vyadhi Lakshana, Ca.Su. – 10/14-16

⇨ If the *Hetu, Purvarupa* and *Rupa* are of moderate nature – look into the description of *Sukhasadhya Vikara* for this explanation

⇨ If the Kala (season), *Prakriti* and *Dushya* are having similar quality of vitiated *Dosha* look into the description of *Sukhasadhya Vikara* for this explanation

⇨ If the diseased person is pregnant lady – the clinician cannot give *Tikshna Dravya* (more potent medicine). He has to give only mild medications (*Mridu Virya Dravya*) and this limits one's approach to any disease.

⇨ If the diseased individual is child or elderly person – children are usually having under developed body tissues and in case of elderly individuals, tissue damage is most common and are physically weak individuals. That is why one cannot administer more potent medicines.

⇨ If the *Upadravas* present in the patient are few in number - look into the description of *Sukhasadhya Vikara* for this explanation

⇨ If the disease is curable with the help of either *Shastra, Kshara* and *Agni karma*

⇨ If the disease is of longer duration - look into the description of *Sukhasadhya Vikara* for this explanation

⇨ If the disease is affecting either *Marma* or *Sandhi*. This indicates the involvement of *Madhyama Rogamarga*. It is usually very difficult to perform *Samshodhana* line of treatment in this occasion.

⇨ Even though there is only one *Dosha* is involved if there is no proper *Chikitsa Chatuspada* is present

⇨ If there is involvement of two *Rogamarga* in the manifestation of the disease and the duration of the illness is of shorter duration - look into the description of *Sukhasadhya Vikara* for this explanation

⇨ If two *Doshas* are involved in the manifestation of the illness

Yapya and Pratyakhyeya Vyadhi Lakshana

शेषत्वादायुषो याप्यमसाध्यं पथ्यसेवया।
लब्धाल्पसुखमल्पेन हेतुनाऽऽशुप्रवर्तकम्॥17॥
गम्भीरं बहुधातुस्थं मर्मसन्धिसमाश्रितम्।
नित्यानुशायिनं रोगं दीर्घकालमवस्थितम्॥18॥
विद्याद्द्रिदोषजं, तद्वत् प्रत्याख्येयं त्रिदोषजम्।
क्रियापथमतिक्रान्तं सर्वमार्गानुसारिणम्॥19॥
औत्सुक्यारतिसंमोहकरमिन्द्रियनाशनम्।
दुर्बलस्य सुसंवृद्धं व्याधिं सारिष्टमेव च॥20॥
Ca.Su. – 10/17-20

Yapya Vyadhi Lakshana:

⇨ The disease persists till the life time of the patient – for example in the person suffering from *Madhumeha* (*Vataja Prameha*) the disease is controllable.

⇨ The disease will be under control

⇨ If the person takes little amount of aetiological factor, the disease will flare up

⇨ The *Gambhira Dhatus* are involved (*Asthi, Majja* and *Shukra*)

⇨ Multiple *Dhatus* are involved

- ⇨ There will be involvement of *Marma, Sandhi*
- ⇨ The disease will be persisting throughout the day
- ⇨ The disease will be of longer duration
- ⇨ Involvement of all the three *Sharirika Doshas* observed

Pratyakhyeya Vyadhi Lakshana

- ⇨ *Tridoshas* will be involved in the manifestation of the illness
- ⇨ All three *Rogamargas* will be involved – for example, the presenting complaint of vomiting (suggestive of *Abhyantara Rogamarga* involvement), loss of strength in left upper and lower limbs (suggestive of *Madhyama Rogamarga* involvement) and skin disease (indicative of involvement of *Bahya Rogamarga*) in a single patient
- ⇨ The disease will not be subsided by any measures either by *Samshodhana* therapy (purificatory procedure) or *Samshamana* therapy (palliative therapy) or *Satvavajaya* therapy (psychotherapy etc) or *Bahirparimarjana* therapy (external therapy such as *Lepa* (application of paste)/ *Abhyanga* (oil massage) etc.
- ⇨ The person will be having *Outsukya* (eagerness to get rid of the discomfort), *Arati* (restlessness) and *Sammoha* (altered state of consciousness)
- ⇨ The person will be weak (physically or mentally)
- ⇨ *Arishta Lakshana* (signs of imminent death) will be observed in the diseased individuals

Application of Sadhyasadhyata of an illness

- ☐ 25 years old male presented with pain abdomen associated with vomiting from past 2 days. This is suggestive of the involvement of *Abhyantara Rogamarga* as *Mahasrotas* will be afflicted and we can observe the involvement of *Vata* and *Kapha Dosha* in the manifestation of the symptoms. Based on the concept of *Rogamarga*, here only one *Rogamarga* is involved. That is why, the person is suffering from *Sadhya Vikara*.
- ☐ 65 years old male patient presented with loss of strength of right side of the body from a period of 6 years; associated with pain abdomen and vomiting from past 2 days. In this occasion, *Madhyama Rogamarga* (loss of strength of right side of the body) and *Abhyantara Rogamarga* (pain abdomen and vomiting) involvement is suspected, as per the principle, if the clinician sees the involvement of two *Rogamarga*, then the disease is *Kricchra Sadhya* or *Yapya Vikara*.
- ☐ The above examples were given by taking into consideration of involvement of *Dosha* and *Rogamarga*. These informations were given only for the proper understanding of the concept of *Sadhyasadhyata*. The following concepts are also considered for the proper analysis of *Sadhyasadhyata* of any illness
  - ⇨ Concept of *Dhatu Vriddhi* and *Kshaya*
  - ⇨ Concept of *Mala Vriddhi* and *Kshaya*
  - ⇨ Concept of *Srotas* involvement
  - ⇨ Concept of duration of the illness
  - ⇨ Concept of nature of *Upadrava* present during the course of the illness
  - ⇨ Concept of exposure to various degree of etiological factor
  - ⇨ Concept of presence of different degree of *Purvarupa* and *Rupa*
  - ⇨ Concept of *Rogabala* and *Rogibala*

To plan the proper line of treatment

- ☐ *Ayurvedic* literatures prefer *Asanna Marga Harana* (elimination of *Dosha* from nearest route) for any disease. For example, in case of *Kaphaja Vikara*, the ideal line of treatment is *Vamana*; in case of *Pittaja Vikara*, the ideal line of treatment is *Virechana*; in case of *Vataja Vikara*, the ideal line of treatment is *Basti*.
- ☐ We know that the *Dosha Utpatti* takes place in the *Koshtha*. If the *Dosha* elimination from the *Koshtha* is done, then we can prevent the occurrence of the disease.
- ☐ If the *Dosha* are present in *Shakha* or *Marmasthi Sandhi*, these *Dosha* need to be brought to *Koshtha*, so that *Asanna Marga Harana* line of treatment can be adopted.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha, Ashtanga Hridaya excerpts

Key points of the chapter

- ⇨ The word Sadhyasadhyata comprises of two words – Sadhya (curability) and Asadhya (incurability) of any disease or illness.
- ⇨ Curability and incurability depends on degree of vitiation of Dosha, duration of the illness, age of the patient, gender of the patient, involvement of body parts in the disease manifestation and progression, presence or absence of Upadrava, involvement of Rogamarga, nature of the treatment.
- ⇨ Sadhya (curable) Vyadhi is classified into two – Sukhasadhya (easily curable) and Krichrasadhya (curable with difficulty). Asadhya (incurable) Vyadhi is classified into two – Yapya (manageable) and Pratyakhyeya (incurable).

Probable questions may be asked in the examination

Long essays

- ⇨ Discuss in detail the criteria of assessment of Sadhyasadhyata of an illness
- ⇨ Classify the diseases based on Sadhyasadhyata and explain the Lakshana of each classification

Short essays

- ⇨ Parameters of Sadhyasadhyata
- ⇨ Sadhyasadhyata
- ⇨ Describe Sadhya Vyadhi Lakshana
- ⇨ Explain Asadhya Vyadhi Lakshana
- ⇨ Roga Sadhyasadhyata explain
- ⇨ Vyadhi Sadhyasadhyata explain
- ⇨ Write about Sadhyasadhyatva Lakshana of Vyadhi
- ⇨ Describe Krichrasadhya Roga
- ⇨ Explain Sukhasadhya Vyadhi Lakshana
- ⇨ Explain the parameters to determine Sadhyasadhyata of a Vyadhiya
- ⇨ Explain Sadhyasadhyatva in detail

Short answers

- ⇨ Sadhyasadhyata
- ⇨ Classify the Vyadhi based on Sadhyasadhyata
- ⇨ Sadhya Roga Lakshana
- ⇨ Sadhya Vyadhi Lakshana
- ⇨ Kashta Sadhya Vyadhi Lakshana
- ⇨ Yapya Roga
- ⇨ Asadhya Vyadhi
- ⇨ Explain the causes of Pratyakhyeya Roga
- ⇨ Sadhyasadhya Vichara
- ⇨ Pratyakhyeya

MCQs

1. **Development of Vata dominant disease in Grishma Ritu in a 67 years old individual from a period of 2 years could be an example of**
   a. Sukhasadhya Vyadhi;
   b. Krichrasadhya Vyadhi;
   c. Both 1 and 2;

d. None of the above

Answer -(b)

2. **Involvement of all three Rogamarga in an individual is an example of**
   a. Sukhasadhya Vyadhi;
   b. Krichrasadhya Vyadhi;
   c. Yapya Vyadhi;
   d. Pratyakhyeya Vyadhi

Answer -(d)

3. **Development of disease in pregnant woman is an example of**
   a. Sukhasadhya Vyadhi;
   b. Krichrasadhya Vyadhi;
   c. Yapya Vyadhi;
   d. Pratyakhyeya Vyadhi

Answer -(b)

4. **Which of the following is incorrect in the consideration of Sukhasadhya Vyadhi?**
   a. Only one Dosha involvement in the disease manifestation;
   b. One Rogamarga involved in the disease process;
   c. Mild Hetu involvement in the disease causation;
   d. The disease is curable with Shastra (surgery)

Answer -(d)

5. **The disease involving Majja Dhatu can be categorized under**
   a. Sukhasadhya Vyadhi;
   b. Krichrasadhya Vyadhi;
   c. Yapya Vyadhi;
   d. None of the above

Answer -(c)

***

12

Principles of Anukta Vyadhi Vinischaya

Learning objectives

- ⇨ Meaning of Anukta Vyadhi
- ⇨ Factors to be included in Anukta Vyadhi
- ⇨ How to apply these in diagnosing the disease

Learning objectives

नास्ति रोगो विना दोर्षर्यस्मात्तस्माद्विचक्षणः॥
अनुत्तमपि दोषाणां लिङ्गैर्व्याधिमुपाचरेत्॥1 9॥

Su.Su. – 35/19

The diseases which are not mentioned in the *Ayurveda* literatures should be known by the features observed which are the resultant of abnormal proportion of *Dosha.* No disease will be manifested without the abnormalities of *Dosha.* To know the exact nature of *Dosha* vitiation, one should ascertain the chronological order of development of symptoms. Each symptom should be analysed based on involvement of *Dosha, Dushya, Srotas.*

वेगा येऽप्यत्र नोद्दिष्टा बहुत्वान्नामरूपतः।
तेषामप्येतदेव स्याद्दोषादीन् वीक्ष्य भेषजम्॥2 9 1॥
दोषदूष्यनिदानानां विपरीतं हितं ध्रुवम्।
उक्तानुक्तान् गदान् सर्वान् सम्यग्युक्तं नियच्छति॥

Ca.Ci. – 30/291-292

As per *Charaka,* there are many diseases which are not mentioned in *Ayurveda* literatures. In such occasion, the clinician should plan the line of treatment depending upon the vitiation of *Dosha,* involvement of *Dhatu* and exposure of the patient to the particular etiological factor.

Diagnosing the disease based on principles of *Ayurveda* is considered to be herculean task. This remains to be tough because of the incomplete understanding of the principles of *Ayurveda* such as *Dosha, Dhatu* and *Mala; Kriyakala; Srotas; Agni; Ama* and *Sadhyasadhyata* etc. Complete lack of understanding of the principles is also due to scattered informations in *Ayurveda* literatures. Here an attempt is being made to simplify these principles and put them in order to make the diagnosis in *Ayurveda* easy.

दोषादीनां त्वसमतामनुमानेन लक्षयेत्॥
अप्रसन्नेन्द्रियं वीक्ष्यं पुरुषं कुशलो भिषक्॥4 5॥

Su.Su. 15/45

The abnormal proportions of *Dosha, Dhatu* and Mala etc are identified by *Anumana* (inference). This inference can be made by observing abnormal or disturbed functions of the *Indriya.* In this context, *Indriya* refers to *Jnanendriya, Karmendriya* and *Ubhayendriya* i.e. *Manas.* For abnormal function of *Pada* (lower limb) in the form of swelling in both lower limbs we may predict the involvement of *Kapha Dosha* in the body and involvement of *Rasa Dhatu* in the body. In *Tvak Indriya,* if the person is presented with rough skin, we may predict the involvement of *Vata Dosha* vitiation and *Rasa Kshaya* in the body. Why such varied presentations can occur in different individuals?

वैलक्षण्यात् शरीराणामस्थायित्वात्तथैव च।
दोषधातुमलानां तु परिमाणं न विद्यते॥4 3॥ Su.Su. 15/43

- ⇨ ***Shariranam vailakshanyat***– because of uniquness of the individual, the degree of *Dosha, Dhatu, Mala* vitiation cannot be quantified. This is further depending upon duration of exposure to etiological factor, exposure to the degree of etiological factor and strength of the individuals which depends on

- ☐ Different degree of *Vatadi Prakriti* in different individuals
- ☐ Different degree of *Tvaksara, Raktasara* etc in different individuals
- ☐ Different degree of *Hrasva, Dirgha* etc *Kaya* of different individuals

⇨ ***Asthayitvat*** – The instability may be in the form of *Nityaga* (time) and *Avasthika* (age of the individual) instability of the *Dosha* in different time of the day, night, season, age groups

Table 12.1: Time of Dosha dominance in relation to diurnal variations

Vata Dosha	Pitta Dosha	Kapha Dosha	
Day	Late part of the day	Mid noon	Early part of the day
Night	Late part of the night	Midnight	Early part of the night

Table 12.2: Seasonal influence on the degree of proportion of Dosha in the body

	Chaya stage	Prakopa stage	Prashamana stage
Vata Dosha	Grishma Ritu	Varsha Ritu	Sharat Ritu
Pitta Dosha	Varsha Ritu	Sharat Ritu	Hemanta Ritu
Kapha Dosha	Shishira Ritu	Vasanta Ritu	Grishma Ritu

Further, the descriptions available in the present literatures of medicine, the diseases explained are not explained in *Ayurveda*. But, by analysing the clinical features are explained in those literatures, we can able to identify the involvement of *Dosha, Dushya* afflicted in the body, affliction of *Srotas* with nature of *Srotodushti*. By noting the chronology of the symptoms, we can able to predict the probable site of *Udbhava Sthana, Sanchara Sthana* and *Vyakta Sthana*.

⇨ The following factors need to be considered in case of analysing any of the pathological process happening in the body based on the fundamentals of *Ayurveda*.

1. Number of complaints and duration of time – analysis of *Dosha* and time
2. GIT symptoms and *Dosha* analysis
3. History of involvement of other organs related to main *Dosha* vitiated
4. Analysis of *Vriddha* and *Ksina Lakshana* of *Dosha, Dhatu* and *Mala*
5. Identifying *Alpa, Madhya* and *Bahudoshavastha*
6. Assessing the *Sadhyasadhyata*
7. Identifying the principal complaint and *Dosha* involved along with *Dhatu Dushti*
8. Identifying the *Srotas* involved along with *Srotodushti Prakara*
9. Assessing the *Vikalpa Samprapti* and applying the *Samanya* and *Vishesha Siddhanta*
10. Application of *Balakala Samprapti*
11. Identifying the *Nidana*
12. Assessment of *Agni* and *Dosha Pradhanya*
13. Degree of *Amatva*
14. Assessment of *Koshtha* – frequency of micturition and defecation
15. Assessment of *Rogibala* and *Rogabala*

The above list of the factors is not complete. Every clinician is having his own thinking towards the understanding of the disease by his clinical expertise. The complete list can be completed by interaction among the team of *Ayurveda* fraternity. The above list which I have enlisted especially to give a few guidelines who have confusions regarding the application of knowledge of the principles of *Ayurveda*.

By analysing the all above said parameters, one can plan the management of the disease including *Purvakarma, Pradhanakarma* and *Pascat karma* and *Samana Cikitsa* and *Pathya* and *Apathya Vivechana*. Before describing the following descriptions, let us make clear that the concept of *Prakriti* and its understanding will not have any significance in diagnosing the disease as per *Ayurveda* principles, it is only helpful in deciding the *Sadhyasadhyata* and proper management of the diseased patient.

Number of symptoms and duration of time

If the person is suffering from an illness showing ten different symptoms. Out of which 7 are indicative of one particular *Dosha*, then we will consider such condition as *Ekadoshaja*. If 4 are indicative of one *Dosha* and another 4 symptoms indicative of another *Dosha*, in such cases, we may infer there may be a possibility of *Dvandva Dosha Prakopa*. If the individuals showing 3 symptoms each of two *Dosha* and 4 symptoms of third *Dosha*, then we may infer that there may a possibility of *Sannipata Dosha Prakopa*.

GIT symptoms and Dosha analysis

Why an *Ayurveda* physician has to stress more towards the GIT symptoms in analysing the *Dosha Prakopa*? The reason is found in classics. All the *Nija Vikaras* which are manifested in the human body are due to weak digestive fire (*Mandagni*). Because of the *Mandagni, Sanchaya* of the *Dosha* takes place in the *Koshtha*. For example, if the person is having the *Vibandha* for past several days, you will suspect the *Sanchaya* of *Vata Dosha*. In case of *Agantuja Vikaras*, first one can observe the discomfort, later one can observe the involvement of *Dosha* after a matter of seven days. In *Agantuja Vikaras*, this principle does not apply.

History of involvement of other organs related to main Dosha vitiated

Pakvasaya, Kati, Sakthi, Srotra, Asthi and *Sparsanendriya* are considered as the sites of *Vata Dosha*. If one suspects that the person is suffering from *Vata Pradhana Vikara*, one has to evaluate the normal and abnormal functions of *Pakvasaya* etc organs also. If one gets the involvement of two or more organs, that indicates the deep seatedness of the vitiated *Dosha* and thus one can come to the conclusion regarding the difficulty in treatment of the disease and prolonged treatment.

Analysis of Vriddha and Ksina Laksanas of Dosha, Dhatu and Mala

In each and every patient, one has to analyse the *Lakshana* which show the *Vriddha* and *Ksina Lakshana* of *Dosha, Dhatu* and *Mala*. Among the *Lakshana* described in the textbooks of *Ayurveda*, *Vriddha Lakshana* of *Dosha* and *Vriddha* and *Ksina Laksanas* of *Dhatu* and *Mala* are of importance as far as the diagnosis is concerned. *Ksina Laksanas* of *Dosha* are not considered as it will lead to *Vriddhi* of some other *Dosha* itself and plays a least role in the manifestation of disease.

Identifying the Alpa, Madhya and Bahudoshavastha

This factor is essential for the precision related to cure of the disease and the time required for the cure of the disease, selecting the best medicine analysing the *Rogabala* and *Rogibala*. To assess this factor, you need to know *Bahudoshavastha Lakshana* and methodological examination of *Rogi*.

Assessing the Sadhyasadhyata

Several factors are described in textbooks, to assess the *Sadhyasadhyata*. To name a few, concept of *Rogamarga*, concept of duration of illness, concept of *Rogabala* and *Rogibala* etc. informations need to be known.

Identifying the principal complaint and Dosha involved along with Dhatudushti

While analysing the symptoms of the disease, one need to identify the principal complaint and even chronology of the symptoms. At the same time, analyse the involved *Dosha* along with *Dhatu dushti* based on the *Vriddhi* and *Kshaya Laksanas* of *Dosha, Dhatu* and *Mala* for each and every symptom the patient is presented with.

Identifying the Srotas involved along with Sroto Dushti Prakara

One has to identify the *Srotas* involved along with *Sroto Dushti Prakara* while diagnosing the disease and planning appropriate management. For example, if the person is suffering from *Atisara*, one can observe the *Srotodushti* of *Purishavaha*, *Udakavaha* and *Annavaha Srotas* and *Atipravritti* is the *Srotodushti Prakara*. If the person is suffering from *Anaha*, *Srotas* affected in such occasion is *Purishavaha Srotas*, but *Srotodushti Prakara* is *Sanga* and *Vimargagamana*.

Assessing the Vikalpa Samprapti and applying the Samanya and Vishesha Siddhanta

By the help of *Vikalpa Samprapti*, you can identify the *Guna* of the *Dosha* that might be increased or decreased, so that you will plan the management of the disease based on *Samanya Vishesha Siddhanta*. For example, in the person who is suffering from *Anaha*, one can observe the increase of *Ruksa*, *Sita Guna* and we need to administer the *Snigdha* and *Usna Guna* to get rid of the disease. As far as *Samanya Vishesha Siddhanta* is concerned, let me quote an example. Suppose if a person suffers from the complaints of *Arochaka*, *Cchardi*, *Amlodgara*. Based on *Samanya Siddhanta*, we will come to know that the person is suffering from *Annavaha Srotovikara*. Based on *Vishishta Siddhanta*, we will come to know the particular disease *Amlapitta*. Detailed evaluation of the history is essential such as duration of complaints, chronology of the symptoms and associated complaints.

Applying the Balakala Samprapti

This concept helps us to identify the predominant *Dosha* involved in the manifestation of the disease. *Kapha Dosha* will be prominent in the case of aggrevation of any symptoms in the early part of the day or night. *Pitta Dosha* predominantly vitiated in the age group between 30 to 60 years. *Vata Dosha* mainly vitiated in the diseases where aggrevation of the symptoms observed after the digestion of the ingested food. This particular concept can be explained by knowing the concept of *Achaya Prakopa*.

Identifying Nidana

One has to make the serious effort to identify the *Nidana* after the careful evaluation of the patient either by history or physical examination. For example, if the person is consuming little amount of *Madya* from short period, leads to the *Vata Vriddhi* by increase of *Ruksa Guna* and if the person is consuming *Madya* in large amounts from long period, leads to excess *Vata Vriddhi* by the increase of *Ruksa Guna* in excess.

Assessment of Agni and Dosha Pradhanya

Depending upon the dominance of the *Dosha* in the patients, different types of *Agni* can be classified. In case of *Vata Pradhanyata*, *Vishamagni* will be present; *Tikshnagni*, *Mandagni* and *Samagni* will be present in cases of *Pitta Pradhanyata*, *Kapha Pradhanyata* and the normal status of *Doshas* respectively.

Degree of Amatva

Knowledge of *Amatva* is highly important as *Ayurveda* Scholars consider the disease manifests in every individuals due to *Ama* which is the product of improper *Agni Vyapara*. One has to analyse the *Ama Lakshana* '*Srotorodha Balabhramsha* etc told by *Vagbhata* has to be analysed in the patient. More number of symptoms or long duration of *Ama Lakshana* indicates the *Prabhuta Amatva*. In other words, less number of symptoms or short duration of *Ama Lakshana* may indicate *Alpa Amatva*. Ama may present in *Koshtha* level (alimentary canal) or *Dhatu* (tissue) level. The identification of degree of *Amatva* may be helpful in deciding the prognosis of the disease as well as predicting the progress of the patient during treatment.

Assessment of Koshtha

All the functions of the *Mahasrotas* can be mainly subdivided in to two major functions, namely *Agni* and *Koshtha*. *Agni* assesses the actual digestive capacity where as *Koshtha* assesses the actual capacity of expulsion of the metabolic residues from the *Mahasrotas*. As per *Vagbhata*, *Krurakoshtha* is present in *Vataja* individuals, *Mridu Koshtha* in *Pittaja* individuals and *Madhyama Koshtha* in *Kaphaja* individuals and in normal *Doshavastha*, there will be *Madhyama Koshtha*.

Assessment of Rogibala and Rogabala

Rogibala and *Rogabala* can be assessed by the proper informations of *Sadhyasadhyata* and *Nidana Panchaka*.

विकारनामाकुशलो न जिह्वीयात् कदाचन।
न हि सर्वविकाराणां नामतोऽस्ति ध्रुवा स्थितिः॥44॥
स एव कुपितो दोषः समुत्थानविशेषतः।
स्थानान्तरगतश्चैव जनयत्यामयान् बहून्॥45॥
तस्माद्विकारप्रकृतीरधिष्ठानान्तराणि च।
समुत्थानविशेषांश्च बुद्ध्वा कर्म समाचरेत्॥46॥

Ca.Su. – 18/44-46

As per *Charaka Samhita*, there are certain techniques to assess the status of the diseased individual. They are

तत्रेदमुपदिशन्ति बुद्धिमन्तः-रोगमेकैकमेवंप्रकोपणमेवंयोनिमेवमुत्थानमेवमात्मानमेवमधिष्ठानमेवंवेदनमेवंसंस्थानमेवंशब्दस्पर्शरूपरसगन्धमेबमुपद्रवमेवंवृद्धिस्थानक्षयसमन्वितमेवमुदर्कमेवंनामानमेवंयोगं विद्यात्; तस्मिन्नियं प्रतीकारार्था प्रवृत्तिरथवा निवृत्तिरित्युपदेशाज्ज्ञायते॥6॥ Ca.Vi. – 4/6

Each and every diseased individual should be *analysed* in terms of

⇨ ***Prakopana***– nature of exposure to etiological factors whether factor related to diet or regimen, nature of food related to specific *Rasa* or *Guna* etc

⇨ ***Yoni***– nature of vitiated *Dosha* whether *Sharirika* or *Manasika*, whether localised or diffuse presence of the symptoms etc

⇨ ***Utthana***– nature of development of symptom, fast spreading or slow spreading or unpredictable development of symptoms may indicate dominance of *Pitta* or *Kapha* or *Vata Dosha* respectively

⇨ ***Atmana***– nature of disease for example, *Grahani* is a chronic disease; *Sanyasa* (unconsciousness) should be treated as emergency as it is difficult to analyse the probable cause of the disease until and unless the interrogation with the patient is being made.

⇨ ***Adhishthana***– site of the disease whether *Sharirika* (physical) or *Manasika* (mental); any part of the body limbs or head or chest and abdomen etc

⇨ ***Vedana***– nature of discomfort; *Toda* (pricking type of pain) indicates the dominance of *Vata*; *Daha* (burning type of pain) indicates the involvement of *Pitta Dosha* during the pathogenesis; *Shvayathu* (presence of swelling) implies the dominance of *Kapha Dosha* during the pathogenesis

⇨ ***Samsthana* (clinical features)**–the presence of liquid stools in increased frequency is suggestive of the dominance of *Vata Dosha* and involvement of *Purishavaha Srotas*. It implies that treatment of *Purishavaha Srotas* affliction and pacification of *Vata Dosha* should be planned. Presence of productive cough indicates the dominance of *Vata* and *Kapha* and involvement of *Pranavaha Srotas*. In this situation, one has to plan the line of treatment of affliction of *Pranavaha Srotas* and main aim is to pacify the vitiated *Vata* and *Kapha Dosha*.

⇨ ***Shabda, sparsha, rupa, rasa* and *gandha***– all these findings may not be applicable in a single disease at a particular time. The presence of *Udara Utsedha* (generalised abdominal swelling) is indicative of the disease *Udara*. This is identifiable by the eye of the clinician. The presence of *Kasa* (cough) is pathognomonic of the involvement of *Pranavaha Srotas* and the diagnosis of the *Kasa* can be made by the nature of sound produced. Productive sputum is suggestive of dominance of *Kapha Dosha* and *Kaphahara* treatment should be planned in this occasion.

⇨ ***Upadrava***– the presence of complications. Whether it is *Sthula* (major) or *Anu* (minor) complications? In most of the occasions, the presence of *Upadrava* may be related to same *Srotas* or connected *Srotas*. For example, in the person suffering from constipation, he may end up with the sequel of *Udavarta*. In this occasion, first there will be abnormality of *Apanavata* followed by the abnormality of *Samana Vata* and *Pranavata* respectively. Thus, initially involvement of *Purishavaha Srotas* will be noted followed by the affliction of *Mahasrotas*.

⇨ ***Vriddhi, Sthana* and *Kshaya***– increased status, normal status and decreased status of *Dosha*. The presence of constipation indicates the increase of *Vata Dosha*. So the line of treatment in this occasion should be to pacify the increased *Vata Dosha*. In other words, if there is increase of *Dosha* is observed one should plan to pacify the vitiated *Dosha*, if the normalcy of the *Dosha* is noted, then it should be maintained and if the decreased status of the *Dosha* is noted, then treatment should be planned to increase the *Dosha* in the body.

⇨ ***Udarka***– sequel of any disease. It is noted that all *Upadrava* can be *Udarka* and all *Udarka* are not *Upadrava*. For example, if 45 years old female patient is presented with injury to the hand while cutting the vegetables, it will heal by fibrosis after few days. The development of fibrosis is termed as *Udarka*.

⇨ *Nama* – name of the disease. 25 years old male individual is presented with pain in the epigastrium associated with burning sensation from 2 days is indicative of the involvement of *Annavaha Srotas*. Therefore, line of treatment should be planned to restore the function of *Annavaha Srotas*.

⇨ *Pravritti* **and** *Nirvritti* – aggravating and relieving factors of *Dosha*. In case of *Vata* dominant diseases, the substances prepared out *Katu, Tikta* and *Kashaya Rasa* are responsible for the vitiation of *Vata Dosha* and the substances prepared out of *Madhura, Amla* and *Lavana Rasa* are leading to the pacification of *Vata Dosha*.

The Diagnosis of the disease based on the fundamentals of Ayurveda, involves three steps

1. ***Vikara Prakriti***– nature of the disease. For example, *Grahani, Kushtha* are considered as *Chirakari Vikara*. *Atisara* is considered as *Ashukari Vikara*. *Pitta* will be inevitably involved in the pathogenesis of the *Jvara*.
2. ***Adhishthana Antara***– affliction of the organ in the disease process. For example, if the person is presented with complaints of disturbance in micturition, one can infer the involvement of *Mutravaha Srotas* in the pathogenesis; if the person is presented with disturbances of defaecation, then involvement of *Purishavaha Srotas* in the disease process can be inferred.
3. ***Samutthana Vishesha***– nature of the etiological factor responsible for the manifestation of the disease. For example, *Ruksha Bhojana* (consumption of dry substances) and *Ratri Jagarana* (awakening at night time) both are responsible for the vitiation of *Vata Dosha*. Lines of treatment in both of these occasions are different. In case of vitiation of *Vata* due to *Ruksha Bhojana*, the ideal line of treatment is consumption of *Snigdha Ahara* (unctuous substances), where as in case of vitiation of *Vata* due to *Ratri Jagarana* (awakening at night time), the ideal line of treatment suggested is *Divasvapna* (sleeping during day time). It is also being said that the person should sleep during day time should be half of the time duration he spent awakening at night time) before meals. In other words, if the person avoids sleep upto 3 hours at night time, he should sleep during day time upto 1 and ½ hours prior to consumption of food.

Let us conclude by saying that if we want to have a thorough knowledge in *Vyadhi Vinischaya* as per principles of *Ayurveda*, the following verses/ *Slokas* should be essentially known to each and every ardent follower of fundamentals of *Ayurveda* compulsorily.

⇨ *Dosha Prakopa Karanas* and *Dosha Kshaya Karanas*

⇨ *Dosha Dhatu Mala Vriddhi* and *Kshaya Lakshana*

⇨ *Sama Nirama Dosha Lakshana*

⇨ *Sroto Dushti Karanas*

⇨ *Sroto Dushti and Viddha Lakshana*

⇨ *Sadhyasadhyata Vyadhi Lakshana*

⇨ *Dosha Upakramas* – this section is not coming under the purview of the subject discussion, that is why this information is not dealt in this textbook.

⇨ Understanding of the concept of *Kriyakala*

Chapter Resources

1. Charaka Samhita, Sushruta Samhita, Ashtanga Sangraha and Ashtanga Hridaya excerpts

Key points of the chapter

⇨ नास्ति रोगो विना दोर्षयस्मात्तस्माद्विचक्षणः।। अनुक्तमपि दोषाणां लिङ्गैर्व्याधिमुपाचरेत्।।19।। Su.Su. – 35/19 The diseases which are not mentioned in Ayurved literatures should be known by the features observed which are the resultant of abnormal proportion of Dosha. No disease will be manifested without the abnormalities of Dosha.

⇨ दोषादीनां त्वसमतामनुमानेन लक्षयेत्।। अप्रसन्नेन्द्रियं वीक्ष्यं पुरुषं कुशलो भिषक्।। Su.Su. 15/45 The abnormal proportions of Dosha, Dhatu and Mala etc are identified by Anumana (inference). This inference can be made by observing abnormal or disturbed functions of Indriya (Jnanendriya, Karmendriya and Ubhayendriya i.e. Manas).

Probable questions may be asked in the examination

Long essay:

⇨ Explain the principles of diagnosis of Anukta Vyadhi

⇨ What is Anukta Vyadhi? Explain the principles of diagnosis of Anukta Vyadhi

Short essays

⇨ Explain in brief about the concept of Anukta Vyadhi

⇨ Anukta Vyadhi

Short answers

⇨ Write a short note on Anukta Vyadhi

MCQs

1. **Udbhava Sthana of Pitta dominant disease as per Ayurveda literatures**
   a. Amashaya;
   b. Pakvashaya;
   c. Both 1 and 2;
   d. None of the above

   Answer -(a)
2. **What type of Srotodushti can be predicted in the person who is presented with increased frequency of watery stools?**
   a. Atipravritti;
   b. Sanga;
   c. Siragranthi;
   d. Vimargagamana

Answer -(a)

3. **The type of Srotodushti predicted in the patient suffering from increased bouts of vomiting is**
   - a. Atipravritti;
   - b. Vimargagamana;
   - c. Siragranthi;
   - d. None of the above

   Answer -(b)

4. **The increase of which of the following Guna is observed in the patient who is having loss of sleep at night for more than 7 days?**
   - a. Laghu;
   - b. Ruksha;
   - c. Snigdha;
   - d. Guru

   Answer -(b)

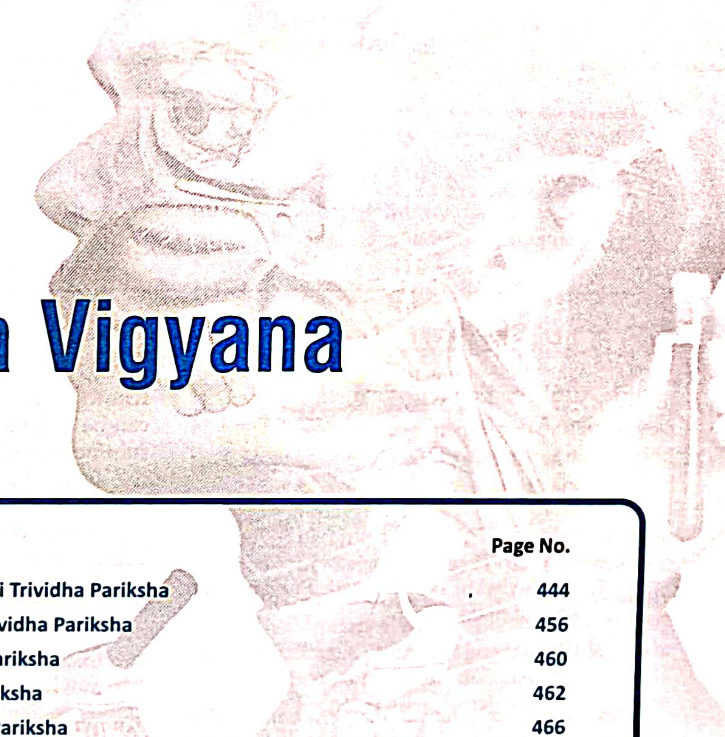
5. **Dosha dominance observed in 1 pm in the mid noon by default is**
   - a. Vata;
   - b. Pitta;
   - c. Kapha;
   - d. All of the above

   Answer -(b)

***

SECTION - V

Pariksha Vigyana



With G.K.'s Opinion

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Aptopadeshadi Trividha Pariksha

1

Learning objectives

- ⇨ Significance of Rogi Pariksha
- ⇨ Textual description of Aptodesha and its current understanding
- ⇨ Textual description of Pratyaksha and its current understanding
- ⇨ Textual description of Anumana and its current understanding

Importance of Rogi Pariksha

तस्य परीक्षा आयुषः प्रमाणज्ञानहेतोर्वा स्याद्, बल दोषप्रमाणज्ञानहेतोर्वा॥ च.वि. - 8/94

As per the literature, the importance of *Rogi Pariksha* is of three folds

1. Knowledge of *Doshabala Pramana* can be attained
2. Knowledge of *Aturabala Pramana* can be attained
3. Knowledge of *Atura Ayu Pramana* can be attained

Knowledge of *Doshabala Pramana*: This can be known by enquiring and observing the duration of *Nidana Sevana* (exposure to etiological factor);

Amount of *Nidana* (exposure to quantity of etiological factor);

Distribution of the symptoms locally or all over the body;

Involvement of *Dushya* in the body;

Involvement of number of *Srotas*;

Status of Agni as per the dominance of *Dosha*;

The capacity to perform the routine activities;

Age of the patient;

Stability or unstability of the mind etc will help in the assessment of degree of *Dosha Prakopa* in the body.

Knowledge of *Aturabala Pramana*: This can be known by the capacity to perform his routine activities during the illness comparing the same with the individual during healthy state; age of the patient; distribution of the symptoms locally or generally; the capacity to digest the ingested food;

The status of the compactness of the body regarding the *Mamsa, Asthi, Sandhi* etc;

Excellence of *Dhatu* i.e. Sara of the individual etc.

Knowledge of *Atura Ayu Pramana*: This can be known by assessing the degree of *Dosha Prakopa*, degree of *Dhatu* involvement age of the patient strength of the individual, mental status of the individual etc. A separate section *Indriya Sthana* in *Charaka Samhita* is being explained regarding the life span of the individual in case of illness.

The person who is skilled in doing the interrogation, examination and analysis based on the informations obtained will be successful in treating the patients. When the person is presented with cough with reddish expectoration, the wise clinician will decide whether it is due to *Pranavaha Srotas* involvement or *Rasavaha Srotas* involvement or *Raktavaha Srotas* involvement. Several examples can be given for this particular quotation.

Aptopadesha Pariksha

तत्रेदमुपदिशन्ति बुद्धिमन्तः-रोगमेकैकमेवंप्रकोपणमेवंया-
निमेवमुत्थानमेवमात्मानमेवमधिष्ठानमेवं-
वेदनमेवंसंस्थानमेवंशब्दस्पर्शरूपरसगन्धमेवमु-
पद्रवमेवंवृद्धिस्थानक्षयसमन्वितमेवमुदर्कमेवंनामानमेवं-
योगं विद्यात् ; तस्मिन्नियं प्रतीकारार्था प्रवृत्तिरथवा
निवृत्तिरित्युपदेशाज्ज्ञायते॥6॥ Ca.Vi. – 4/6

- ⇨ The word *Aptopadesha* comprises of two words. ***Apta*** are the people who are free from doubts and ambiguous thoughts, their memory is unimpaired i.e. they know the things in their entirety by their earlier experiences. They don't have the mental disturbances and devoid of *Rajas* and *Tamo Dosha*. The word ***Upadesha*** refers to the sayings of the *Aptas*.
- ⇨ As from the *Roga Nidana* point of view, *Aptopadesha* is the set of *Pariksha* which includes the methods described in the literatures regarding the enquiry of the patient regarding the details of the complaints, method of examination of the patient in general, details of the individual diseases with etiological factors, prodromal symptoms, symptoms of the disease, complications, methods to identify these. Each *Lakshana* should be analysed with the following points. Chronological order of the presentation of the *Lakshana* in terms of *Dosha, Dushya, Srotas* has to be analysed. This will be helpful in framing out the probable pathogenesis of the disease.

The factors described under the heading of Aptopadesha by Charaka are as follows

- ⇨ ***Prakopana–*** refers to *Ruksha* etc *Bahya Hetu*. In other words, *Ruksha* (dry substances), *Shita Bhojana* (cold substances), *Ratrijagarana* (awakening at night time), *Ativyayama* (excessive exercise) etc for *Vata Dosha Prakopa*, *Amla* (excess consumption of sour substances), *Katu Bhojana* (excess consumption of pungent substances), *Upavasa* (fasting), *Atapa Sevana* (exposure to sunlight) for *Pitta Dosha Prakopa*, Guru (excess consumption of substances which are heavy to digest), *Snigdha Bhojana* (excess consumption of unctuous substances), *Divasvapna* (having day nap), *Avyayama* (sedentary life style) for *Kapha Dosha*. *Bahya Hetu* includes both *Ahara* and *Vihara*.
  - ☐ For example, there are three patients having the *Kapha Dosha* vitiation. In first person who has the habit of consumption of 2 *Kadali* (banana) for the period of 7 days; in the second individual, the person has the habit of consumption of 2 *Kadali* (banana), *Masha* (dishes prepared out of blackgram) for the period of 7 days; in the third person, the person has the habit of consumption of 2 *Kadali*, *Masha* (dishes prepared out of black gram) and having the habit of *Divasvapna* (nap in the day time) for the period of 7 days. Among these, there will be minimum vitiation of *Kapha Dosha* in first individual and maximum vitiation of *Kapha Dosha* in third individual.
- ⇨ ***Yoni–*** refers to *Abhyantara Hetu*, particularly *Dosha* only. which *Dosha* is vitiated? Whether *Sharirika Dosha* or *Manasika Dosha* or both *Dosha* affected or not? This can be assessed by analysing each of the symptom in terms of *Dosha* and *Dushya* involvement. For example, the presence of pain always indicates involvement of *Vata Dosha*, the presence of raised temperature always indicates *Pitta Dosha* vitiation and the presence of pus always indicates the involvement of *Pitta* and *Kapha Dosha*. Presence of swelling indicates the dominance of *Kapha Dosha*. Presence of reddish coloured swelling indicates the dominance of *Pitta* and *Kapha Dosha*.
- ⇨ ***Utthana–*** denotes the development of the symptom. The rapid development of the symptom suggestive of *Pitta Dosha*. The slow development of the symptom is suggestive of *Kapha Dosha*. The unpredictable nature of manifestation of the symptom is suggestive of *Vata Dosha*.

Development of the symptoms in the midnight implies the dominance of the *Pitta Dosha* in the pathological process.

- ***Atmana***– suggestive of the *Svabhava* (nature) of the disease. The disease *Rohini* is considered to be *Daruna* (strength of the disease is more than the strength of the patient) in nature. The disease *Sanyasa* (unconsciousness) is considered to be treated as emergency. The disease *Visarpa* (set of disease related to skin where spread of *Dosha* is very rapid) is considered to be fast spreading disease. *Kushtha* (any skin disease) is considered to be slowly spreading disease. *Grahani* (disease where malabsorption is observed) is considered to be chronic debilitating disease.
- ***Adhishthana***– one has to determine whether the disease is involving the *Sharira* (somatic) or *Manas* (psychic) or both (psychosomatic)? In case of *Sharira*, one should try to further categorise the disease regarding the part of the body involved – *Skandha* (trunk) or *Shakha* (extremities); *Dosha* afflicted during the pathogenesis, which of the *Dushya* involved in the disease process? which of the *Srotas* involved in the disease process? Whereas in case of *Manasika Vikara*, we have to *analyse* the involvement of *Rajas* or *Tamo Dosha*, so that specific line of treatment *Satvavajaya Chikitsa* should be planned. All these will be helpful in deciding the nature of the treatment to be adopted in the diseased individuals.
- ***Vedana***– character of the discomfort has to be ascertained. For example, if the person is having the pricking or tearing type of pain indicative of the *Vata Dosha* involvement. If the person is having burning type of the pain in *Kukshi* (abdominal region) or *Daha* (burning sensation) all over the body is suggestive of vitiation of *Pitta Dosha*. If the person is presented with the complaints of either heaviness of the head or itching is suggestive of the increase of *Kapha Dosha* in the body.
  - The increase of the *Dosha* may be either localised or generalised. If 1 person is suffering from *Rasa* or *Rakta* related disorder, usually shows generalised clinical presentation whereas if the person is suffering from *Mamsa* or *Asthi* related disorder, usually the clinical presentation is localised.
  - Let us take the example of *Kasa*. If the person is presented with *Kasa* (cough) which is having very little amount or watery sputum, implies the *Vata* dominance at that particular juncture; if the person is presented with yellowish coloured sputum associated with *Jvara* (raised body temperature), then it indicates the dominance of *Pitta* and when the person is presented with thick whitish coloured sputum with association of *Jvara*, implies the *Kapha* dominance at that particular point of time.
- ***Samsthana***– is the synonym of *Rupa* (clinical features). In the literatures features of individual disease is explained. The presence of *Deha Santapa* (burning sensation in the body) confirms the diagnosis of *Jvara*.[1] The expulsion of contents of *Amashaya* (stomach) through mouth confirms the diagnosis of *Chardi*. The colour of *Ketaki Dhuli* (yellowish white) discolouration of the skin confirms the diagnosis of *Pandu*. The increased frequency of passage of liquid to semisolid stools confirms the diagnosis of *Atisara* (diarrhoea).
- ***Shabda, sparsha, rupa, rasa* and *gandha***– all these findings may not be applicable to a single disease at a time. In case of *Anaha* (distension of the abdomen), there will be *Gudugudayana Shabda* (borborygmi – loud peristaltic sounds) heard over the abdomen. In case of *Kamala* (jaundice), the clinician can see the *Bhekavarna*[2] (yellowish discolouration) through the eyes. In case of *Kapala*[3] *Kushtha* (skin disease having *Vata Dosha* dominance), the skin will be rough in touch.

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[1] To confirm the diagnosis of *Jvara*, associated features such as time of onset of the symptom, *Shushka Kasa* (dry cough), etc should be analysed. This may confirm the diagnosis of *Vataja Jvara*. Likewise, it should be applied to other diseases too.
Ca.Ni. – 1/21

- ***Upadrava***– may be either *Sthula* (major) or *Anu* (minor) *Upadrava*. Usually *Upadrava* are observed in the same *Srotas* or connected *Srotas* of primary disease. For example, *Udavarta* is considered to be the *Upadrava* of *Vataja Prameha*. The possible explanation for this explanation could be either *Udavarta* due to *Mutravega Rodha* or could be due to vitiation of *Apana Vata* which in turn is responsible for *Purishavega*[4] *Rodha*. While analysing the *Upadrava*, a special consideration towards the same *Srotas* or *Srotomula* related to presenting complaint or nearby *Srotas* has to be given. Also, the chronology of the presenting complaints should be given equal importance.
- ***Vriddhi, sthana* and *kshaya***– increased, normal and decreased states of Dosha, *Dhatu* and *Mala* should be assessed from tallying the *Lakshana* told in the literatures with that of the *Lakshana* present in the patient. These *Lakshana* are mentioned in the context of *Dosha Vriddhi, Kshaya Lakshana* in earlier pages. For example, 55 years old male patient is suffering from constipation for a period of 15 days, it implies that the person is having the increase of *Vata Dosha* at that particular point of time.
- ***Udarka***– consequence of any illness. For example, any type of external wound is healed by scar tissue. This scar tissue can be considered as *Udarka*. *Udarka* refers to the consequence of any illness. *Udarka* may be harmful or harmless. Harmful *Udarka* can be termed as *Upadrava* which may be either minor (*Anu*) or major (*Sthula*). Healed scar tissue will not cause any life threatening consequences. This is termed as *Udarka*. 15 days after the remission of *Kaphaja Kasa*, the presence of *Shushka Kasa* is *Udarka* for *Kaphaja Kasa*.
- ***Nama***– name of the disease is described in the literatures. Naming is done on several parameters. This is discussed elsewhere in the context of the naming of the diseases i.e. *Vyadhi Namakarana Siddhanta*. For example, because of loss of *Smriti* (memory) for short time associated with *Bhibhatsa Chesta* (involuntary movements of the limbs) suggests the diagnosis of *Apasmara*. *Gudena Atidravamala Pravritti* (increased frequency of loose stools through anus) suggests the diagnosis of *Atisara*. *Prabhuta* (abundant quantity) and *Avila Mutrata* (turbid urine) is the pathognomonic symptom of *Prameha* (set of conditions associated with increased frequency and amount of micturition). *Deha Santapa* (raised body temperature) and *Mana Santapa* (disturbance in functions of *Manas*) is suggestive of the diagnosis of *Jvara*.
- **Yoga**– different formulations for the treatment of different diseases is discussed in the literatures. The description of yoga is not the main issue of the present textbook. For example, prescription of *Ananda Bhairava Rasa* is specifically indicated in the people who are suffering from *Jvara* and *Atisara* (fever associated with liquid to semisolid stools).
- ***Pravritti* and *Nivritti***– indication and contraindication in case of any illness. This is used in case of management of any disease. For example, in the patient who is suffering from *Jvara*, *Pachana* (measures leading to *Ama Pachana*), *Langhana* (measures leading to lightness of the body) is indicated; and *Divasvapna* (sleeping during day time) and *Snana* (bathing) are

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[2] Ca.Chi. – 16/35
[3] Ca.Chi. – 7/14
[4] Ca.Su. – 7/8

contraindicated. *Pachana* and *Langhana* is indicated to pacify the presence of *Ama* in the body and to kindle the reduced function of Agni (digestive fire). *Divasvapna* (sleeping during day time) and *Snana* (bath) are contraindicated which will increase the *Ama* stage in the body which further worsen the status of Jvara.

Pratyaksha Pariksha

आत्मेन्द्रियमनोऽर्थानां सन्निकर्षात् प्रवर्त्तते।
व्यक्ता तदात्वे या बुद्धिः प्रत्यक्षं सा निरुच्यते॥7॥

Ca.Su. – 11/7

प्रत्यक्षतस्तु खलु रोगतत्त्वं बुभुत्सुः सर्वैरिन्द्रियैः सर्वानिन्द्रियार्थानातुरशरीरगतान् परीक्षेत, अन्यत्र रसज्ञानात्; Ca.Vi. 4/7

Pratyaksha Jnana is possible when *Atma* (soul), *Manas* (mind), *Indriya* (sense organs) and *Indriyartha* (respective senses) are coming in contact together at a particular time. If any one among these four is in deviation from contact, there will be no *Pratyaksha Jnana*. Except the knowledge obtained by *Rasanendriya* all are coming under the concept of *Pratyaksha* Pariksha. *Rasanendriyajanya Jnana* is categorised under *Anumana Pariksha*. This has to be assessed by inquiry to the patient regarding the abnormal taste perceptions.

Sravanendriya Pariksha

तद्यथा-अन्त्रकूजनं, सन्धिस्फुटनमङ्गु-लीपर्वणां च, स्वरविशेषांश्च, ये चान्येऽपि केचिच्छरीरोपगताः शब्दाः स्युतांञ्छ्रोत्रेण परीक्षेत; Ca.Vi. 4/7

Antrakujana (gurgling sounds in the abdomen), *Sandhi, Anguli* and *Parva Sphutana* (cracking sound in the joints, fingers); changes observed vocal sounds; sounds heard during *Kasa* (nature of cough), *Svarabheda* (hoarseness of voice), *Svasa* (breathlessness) and *Hikka* (hiccup) etc clinical conditions. In this type of examination, *Srotrendriya* of the physician is used to examine the patient. In case of *Sandhigata Vata*, one can hear the cracking sounds in the joints.

Chakshurindriya Pariksha

वर्ण-संस्थानप्रमाणच्छायाः, शरीरप्रकृतिविकारौ, चक्षुर्वैषयिकाणि यानि चान्यान्यनुक्तानि तानि चक्षुषा परीक्षेत; Ca.Vi. 4/7

Varna (different discolouration), *Samsthana* (different varieties of lesions, signs of the disease), *Pramana* (measurements of different lesions – such as swellings, discolourations, *Sirayama* (dilated veins), *Chaya* (lack of lustre) are some of the *Chakshurindriyajanya Bhava*. In case of *Vatapradhana Vatarakta*, the clinician can see the varicosity or tortuosity of the veins. In case of *Pakshaghata*, the reduced function (*Akarmata*) of the part of the body is observed.

In *Indriya Sthana, Charaka* explains about the normal and abnormal colours of the body. Normal colours[5] are *Krishna* (black), *Shyama* (bluish), *Avadata* (whitish), *Shyamavadata* (bluish white). The abnormal[6] colours are *Nila* (blue), *Syava* (blackish), Tamra (coppery), *Harita* (greenish) and *Shukla* (abnormally white).

Rasanendriya Pariksha

रसं तु खल्वातुरशरीरगतिमिन्द्रियवैषयिकमप्यनु-मानादवगच्छेत्, न ह्यस्य प्रत्यक्षेण ग्रहणमुपपद्यते, तस्मादातुरपरिप्रश्नेनैवातुरमुखरसं विद्यात्, यूका-पसर्पणेन त्वस्य शरीरवैरस्यं, मक्षिकपेसर्पणेन शरीरमाधुर्यं, लोहितपित्तसंदेहे तु किं धारिलोहितं लोहितपित्तं वेति श्वकाकभक्षणाद्धारिलोहितमभक्षणाल्लोहितपित्तमि-त्यनुमातव्यम्, एवमन्यानप्यातुरशरीरगतान् रसाननुमिमीत; Ca.Vi. 4/7

Tastes of various factors in the body of the patient are the objects of gustatory sense organ. They can however be ascertained by inference and no direct usage of tongue of the clinician used. *Charaka* has given the different examples in the context of *Rasanendriya Pariksha*. Inference of impairment of the taste of the body by lice etc going away from the body, sweet taste of the body by the attraction of the flies towards the body. In the diagnosis of *Lohitapitta* (bleeding diatheses), in case of bleeding from the body, if there is doubt regarding *Raktapitta* (bleeding diatheses), it should be resolved by giving the blood to dogs and crows to eat. Intake of food mixed with blood by dogs and crows is indicative of its purity and rejection of these foods by these animals suggests the diagnosis of *Raktapitta*.

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[5] Ca.I. – 1/8

[6] Ca.I. – 1/9

Ghranendriya Pariksha

गन्धां स्तु खलु सर्वशरीरतानातुरस्य प्रकृतिवैकारिकान् घ्राणेन परीक्षेत; Ca.Vi. 4/7

Normal and abnormal smells of the entire body of the patient should be examined by the olfactory sense organ of the clinician. This includes the normal and abnormal smells of faeces, urine, sweat, discharge of wound and different smells mentioned in *Indriya Sthana* of *Charaka Samhita*. E.g. the patient with Escherichia coli infection will have fishy odour of urine. Regarding faeces, a certain degree of offensiveness is normal due to the presence of indol and skatol, constituents which are more plentiful when the diet contains much amount of meat. When the offensiveness is excess, some derangement of digestion or absorption should be suspected. If it is temporary, will have no serious significance. There will be musty smell due to putrifaction of proteins in pancreatic disease.

Regarding vomitus, most vomitus possess a fetid odour due to the presence of acid, but offensiveness usually indicates serious disease. e.g. malignant disease of pylorus due to excess fermentation in the retained gastric contents. There will be faeculant odour in intestinal obstruction.

Sparshanendriya Pariksha

स्पर्शं च पाणिना प्रकृतिविकृतियुक्तम्। Ca.Vi. 4/7

According to *Charaka*, normal and abnormal touches of the patient should be examined by the hand of the clinician. *Nadi Pariksha* can also be included in this category. Examination of the patient in case of *Jvara, Shotha, Gulma* etc is done with the help of the hand i.e. *Sparshanendriya Pariksha*.

Anumana Pariksha

इमे तु खल्वन्येऽप्येवमेव भूयोऽनुमानज्ञेया भवन्ति भावाः। तद्यथा-अग्निं जरणशक्त्या परीक्षेत, बलं व्यायामशक्त्या, श्रोत्रादीनि शब्दाद्यर्थग्रहणेन, मनोऽर्थाव्यभिचरणेन, विज्ञानं व्यवसायेन, रजः सङ्गेन, मोहमविज्ञानेन, क्रोधमभिद्रोहणे, शोकं दैन्येन, हर्षमामोदने, प्रीतिं तोषेण, भयं विषादेन, धैर्यमविषादेन, वीर्यमुत्थानेन, अवस्थानमविभ्रमेण, श्रद्धामभिप्रायेण, मेधां ग्रहणेन, संज्ञां नामग्रहणेन, स्मृतिं स्मरणेन, ह्रियमपत्रपणेन, शीलमनुशीलनेन, द्वेषं प्रतिषेधेन, उपधिमनुबन्धेन, धृतिमलौल्येन, वश्यतां विधेयतया, वयोभक्तिसात्म्यव्याधिसमुत्थानानि काल-देशोपशयवेदनाविशेषेण, गूढलिङ्गं व्याधिमुपशयानुपश-याभ्यां, दोषप्रमाणविशेषमपचारविशेषेण, आयुषः क्षयमरिष्टैः, उपस्थितश्रेयस्त्वं कल्याणाभिनिवेशेन, अमलं सत्त्वमविकारेण, ग्रहण्यास्तु मृदुदारुणत्वं स्वप्नदर्शन-मभिप्रायं द्विष्टेष्टसुखदुः खानि चातुरप्रश्नेनैव विद्यादिति॥8॥

Ca.Vi. 4/8

Anumana Pariksha is the means by which the diagnosis is made by inference. The presence of yellowish coloured vomitus, we assume the *Pitta Prakopa* in that instance. The presence of *Gudugudayana Shabda* suggests the *Vata* dominance at that specific time. There are several factors mentioned by *Charaka* wherein *Anumana* is used.

Agnim Jaranashaktya Parikshet– the power of digestive function is assessed by the time required for the digestion of ingested food. The digestive function is influenced by several factors – the amount of food intake, the ingredients of food, the nature of food intake etc. As far as the amount of food intake is concerned, if the person takes large amount of food, naturally it takes long time to have the complete digestion of food and if the person consumes little amount of food and it takes short time for the complete digestion of food. As far as the ingredients of food are concerned, if the person consumes the food prepared out of blackgram (*Masha*), it takes long time to the digestion of food (increase of *Kapha*). If the person consumes (*Panasa* or jackfruit), it takes longer time to the digestion of food (due to the increase of *Vata Dosha* (increase of *Vishtambha* quality)). As far as the nature of food intake is concerned, there are certain rules are made to follow while the consumption of food. For example, the food should be taken in calm mind, calm atmosphere, without talking among the people surrounding him, without laughing etc. If the person does not follow above instructions, he may likely to develop the abnormal digestive function.

Balam Vyayama Shaktya Parikshet– the strength of the patient should be assessed by the degree of ability to perform the exercises. This is known by the assessment of pulse rate, respiratory rate, nature of breathing, exertion on performing exercise. The strength will be more in the people having the habit of doing daily exercise. E.g. coolie workers. The strength will be less if the person is having severe debilitating illness such as stroke, myopathy etc.

Shrotradini Shabdadi Arthagrahanena– conditions of the sense organs are assessed by their capacity to perceive the respective objects like sound etc. The perception of hearing is tested by whispered voice test or spoken voice tests and tuning fork tests – *Rinnie* test, Weber test etc. This is applicable for *Ghranendriya* for the assement of smell; *Chakshurindriya* for the assessment of vision; *Sparshanendriya* for the assessment of touch; *Rasanendriya* for the assessment of taste.

Mano Artha Avyabhicharanena– existence of the mind can be assessed from the perception of specific objects even in the presence of all other senses along with their objects. Nowadays, this is tested by assessing the general behaviour such as consciousness and interest in surroundings and mini mental status examination such as attention, presence or absence of delusion, misinterpretation, hallucination, orientation of space and time etc.

Vigyanam Vyavasayena– knowledge of a thing can be assessed by proper action and reaction to it. E.g. a computer engineer will be knowing about the scope of computers in different fields such as medicine, social fields in a better way than others. An agriculturist will be knowing the best season to grow certain crops, seasonal conditions for the development of crops; a tailor will be knowing the present trends in the society, how much cloth is needed to make a dress etc. Thus, level of one's knowledge can be assessed by depth of the understanding of the skill related to field of work.

Rāja Sangena– presence of attachment towards woman or child or near and dear ones is helpful in assessing the *Rajoguna* of an individual. This attachment is caused by *Rajo guna* alone. This is responsible for the continuous thinking of that particular object or person.

Moham Avijnanena– the level of ignorance is assessed by the level or extent of ignorance related to one particular subject. For example, if 25 years old individual is presented with yellowish discolouration of sclera, skin and if he is giving the history of malaria for a period of 10 days previously, if the clinician says it is due to viral hepatitis or alcoholic liver disease, then it is considered to be ignorance from the part of the physician. The presenting complaint of yellowish discolouration should be related to sequel of malaria.

Krodham Abhidrohena– presence of anger can be known by the patient's attitude of revengeful disposition. This will usually occur in the people when they will not get desired object at a particular time or when they will get undesired or disliked object at a particular time or when another individual does harm or ill treatment towards him. Such situation in an individual will be responsible for the development of anger.

Shokam dainyena– sorrow of a person is known from the patient's sorrowful attitude. When an individual cries or becomes gloomy while describing his case history, then one can assume that he is in a state of sorrow. During a state of sorrow, the person will not be having any courage to do any activity, and he will be full of negative thoughts.

Harsham Amodena– joy is known from happiness. The word '*Amoda*' refers to various activities such as dancing, singing etc. This state suggests that the person is in a happy mood, and he is having pleasant mind.

Preetim Toshena– pleasure is assessed by satisfaction which is reflected by joyous appearance of the face, eyes etc. If an individual gets satisfied after attaining an object or meeting his near and dear ones, we can see joyous appearance of one's face, eyes etc. If an individual shows joyful face and eyes, we can say that the person is very much affectionate to food substances.

Bhayam Vishadena– fear known by level of apprehension. This state is very well described in *Arjuna* in the context of war between *Kaurava* and *Pandava* in *Kurukshetra*. This is described during the conversation between Krishna and Arjuna prior to *Kurukshetra* war. Arjuna says he is having fear to lose all his relatives and brothers following the far among them. That means the person will be having less degree of courage.

Dhairyam Avishadena– courage is assessed from the strength of the mind even when one is in dangerous situation. For example, showing courage when a person is in front of snake or in front of lion or when a natural calamity happens.

Viryam Utthanena– energy of an individual is assessed from his initiative in the actions which are normally difficult to perform. If the person is having the adequate initiative in performing any activities for example, running or any sports activity, he can excel in his career. Here, along with initiative, persistence in the same activities is also essential. It is being said that if a person is doing or learning any subject for 10,000 hours, he can excel in his profession.

Another meaning of *Virya* is 'semen'. If the *Shukra Dhatu* is in normalcy and the person is not having any physical or mental stress, the person will get adequate erection during sexual intercourse. That means quality of semen is being tested by the person's ability to perform sexual intercourse.

Avasthanam Avibhramena– stability of the mind is assessed from the avoidance of any mistake. This is especially observed in the people who are fast learners. These people will learn from their own mistakes, so that they will not repeat the same mistakes in future. They will also learn from others' mistakes too. Performing the activity without any mistake itself states that the person is aware of him and his surroundings.

Shraddham Abhiprayena– Desire is assessed from the request of an individual. For example, if 26 years old male individual who is having the occupation of teaching, and if he shows frequent interest in cooking, then it can be inferred that the person is having *Shraddha* towards cooking.

Medham Grahanena– intelligence is known from the power of comprehension of scriptures. This is nothing but one's ability to understand the subject thoroughly and to recall the same when need arises. A person is asked to read a page or two, after ½ an hour, asking the person what he has read ½ an hour earlier. If the person is able to recollect what he has read accurately, then we can say his *Medha* is *Pravara* or superior quality.

Samjnam Namagrahanena– Recognition is assessed from the recollection of the name. For example, pen is being named as it is used as a tool for writing. The presence of yellowish discolouration is helpful in identifying the presence of vitiation of *Pitta* in the body. The presence of involuntary movements in the body is helpful in predicting the vitiation of *Vata* in the body.

Smritim Smaranena– memory is assessed from the power of remembrance. For example, the date of the birth, place of the birth, date of marriage, name of the spouse, name of the children, any specific major event in the person's life, nature of breakfast on that particular day etc.

Hriyam Apatrapanena– modesty is assessed from bashfulness. When a person does any activity which brings shame to the person, the person usually shows downward face. This will be associated with either crying or grimaces. For example, if a person is presented with severe degree of headache not relieved by any medications the person will show grimaces over his face.

Shilam Anushilanena– liking is assessed from repeated activity. For example, if the person is repeatedly doing the cooking, we can say he likes cooking. If the person is frequently playing cricket, we can say that he likes playing cricket.

Dvesham Pratishedhena– dislike is assessed from disinclination towards any object. For example, if the person is repeatedly avoiding walking on repeated saying, we can say that he dislikes walking. If the person is avoiding playing chess on repeated sayings also, then we can say that he dislikes chess.

Upadhim Anubandhena– deception is assessed from subsequent manifestations. An individual pretending to be a well wisher but actually having evil intentions can be judged from his subsequent activities like murder of the brother etc.

Dhritim Aloulyena– courage is assessed from firmness. For example, if a person is coming across with poisonous snake, if he tries to catch the snake, shows his courage in such situation.

Vashyatam Vidheyataya– obedience is known from compliance with others. For example, if the patient is presented with *Pitta* dominant disease, the physician prescribes the *Pitta* pacifying medicines by saying to avoid the substances prepared out of *Katu*, *Amla* and *Lavana Rasa*. If the patient strictly follows whatever told by the patient, then it suggests that the patient is obedient to the physician.

Vayo Bhakti Satmya Vyadhisamutthanani Kala Desha Upashaya Vedana visheshena– age, liking, homologation and cause of disease can be assessed from knowing the stage of life, habitat, conduciveness and characteristic features of pain respectively. For example, if the patient is showing development of secondary sexual characters, then it indicates the person is in *Balyavastha* who is having *Kapha* dominance.

Bhakti is assessed by *Desha* or place of origin of food substances or place of the person. For example, if the person is a resident of Punjab, then it can be inferred that he may have the habit of consumption of *Godhuma* (wheat). If the person is the resident of *Kerala*, then it can be inferred that he may have the habit of consumption of *Shali* (rice). If the person is a resident of *Gujarat*, then it may be inferred that he may have the habit of consumption of sweets in the breakfast. If the person is a resident of *Rajasthan*, then it can be inferred that he may have the habit of consumption of mustard oil.

Satmya is assessed *Upashaya* (homologation therapy). For example, if the person is having the relief from *Jvara* on consumption of *Shunthi*, it can be inferred that the person is suffering from *Vatakaphaja Jvara*. Due to the *Ushna* (hot) quality, the person usually gets relief from the presenting complaint. This information suggests that *Shunthi* is ideal in the patients suffering from *Vatakaphaja Jvara*.

Vyadhisamutthanani Vedana Visheshena– cause of the disease can be assessed by nature of discomfort. For example, if the person is presented with pricking type of pain, it indicates that the person is suffering from *Vata* dominant disease. If the person is presented with the complaint of accumulation of pus in the lower limb or any part of the body it indicates the person is having the dominance of *Kapha Dosha* in the body.

Gudhalingam Vyadhim Upashaya Anupashayabhyam Parikshet– diseases having latent symptoms are diagnosed from the administration of such therapies as would aggravate or alleviate the condition. Diseases having well manifested symptoms can be diagnosed by the appearance of the *Lakshana* only and for their diagnosis, exploratory therapies are not required. E.g. if there is a doubt in *Vatavyadhi* and *Urustambha*, apply the medicated oil and massage the affected area of the body. If the condition improves then *Vatavyadhi* is diagnosed and if the condition worsens then the diagnosis of *Urustambha* is made. Nowadays, *Upashaya* is called as therapeutic test.

Dosha Pramanam Apachara Visheshena– degree of vitiation of *Dosha* can be assessed from degree of consumption of etiological factors or provocative factors. If the provocative factors are less, then the *Dosha* vitiation will be mild. For example, 27 years old male of *Vata Prakriti* is performing exercise for 45 minutes for a period of 7 days. Another male individual of *Vata Prakriti* performing the exercise for 90 minutes for a period of 30 days. It is very clear that the former individual will be having minimum *Vata* vitiation when compared to the second individual.

Ayushah Kshayam Arishtaih– approaching death can be assessed by the appearance of bad prognostic signs.

For example,

श्वयथुर्यस्य कुक्षिस्थो हस्तपादं विसर्पति।
ज्ञातिसङ्घं स संक्लेश्य तेन रोगेण हन्यते॥12॥

Ca.I. – 6/12

If an individual is presented with the complaints of increased abdominal swelling followed by the swelling in the upper and lower limbs followed by the altered state of consciousness, implies that the person is approaching death. The chronology of clinical features indicates the involvement of advanced stage of hepatobiliary disease.

Upasthita Shreyastvam Kalyanabhiniveshena– approaching prosperity can be known from the initiation of useful work. For example, the development of school in a remote village implies that that particular village is showing the signs of improvement. The improvement in the symptom of pain in the patient of *Gridhrasi* is suggestive of improvement in the pathological process.

Amalam Satvam Avikarena– promotion of *Sathvika* qualities of the mind can be assessed from the absence of its impairments – attachment, envy etc.

Similarly, by interrogating with the patient, *Mridu* and *Krura Koshthata* (excretory function of alimentary canal); nature of dreams; desires for food; likes and dislikes; happiness and unhappiness etc should be assessed from *Anumana*.

Understanding the relevance of Aptopadeshadi Trividha Pariksha in current era

⇨ Let us take the example of 40 years old individual is presented with headache on exposure to sunlight around 11 am and persists till the evening at 4 or 5 pm, based on dominance of *Dosha* and diurnal variation, we can infer the dominance of *Pitta Dosha* for the development of headache. In this example, we can infer the dominance of *Pitta* based on two different factors namely, age of the individual (between 30 to 60 years) and worsening of the symptoms in a day i.e. during the exposure to sunlight. Suppose, if the same individual is having the habit of consuming potato chips sprinkled with *chilli* powder and salt, this is an additional factor for the dominance of the *Pitta*. If the same individual is having the habit of consuming items prepared by blackgram, then there is further possibility of vitiation of *Pitta* due to *Ushna Virya* of *Masha* (blackgram) and we usually keep the batter prepared out of *Masha* for overnight for fermentation. If the same individual is having the habit of consumption of bakery items such as bread or pups etc, there is possibility of vitiation of *Pitta* in a much severe degree. In this, we cannot make any alteration in the age of the individual, but we can change the food habits i.e. avoiding potato chips sprinkled with chilli powder and salt, substances prepared by blackgram, bread, pups etc and regimen such as rescheduling the day today activities avoiding the exposure to sunlight. In other words to say, if the number of aetiological factors for increase of a particular *Dosha* is increasing, that will usually result in the degree of vitiation more severe. This is the application of *Aptopadesha Pariksha* in the current era.

- Let us take the example of *Antrakujana* (gurgling sounds in the intestine), this is analysed with the help of aid of ear. In case of severe form of *Vibandha* (constipation) of longer duration, we can get more severe form of *Antrakujana* which can be heard without the aid of stethoscope. This is the application of *Pratyaksha Pariksha* in the current era. For this presenting complaint, we can give *Anulomana* line of treatment which helps in downward movement of vitiated *Vata Dosha* in the body. This is the application of *Aptopadesha*.

Chapter Resources

1. Charaka Samhita, Sushruta Samhita and Ashtanga Sangraha excepts

Key points of the chapter

- This method of Trividha Pariksha is explained in Vimana Sthana of Charaka Samhita. The purpose of Aptopadeshadi Trividha Pariksha is knowledge of Doshabala Pramana, knowledge of Aturabala Pramana and knowledge of Atura Ayu Pramana can be attained.
- By the help of Aptopadesha Pariksha, we are going to analyse the details regarding the extent of exposure to Nidana by the patient, degree of Dosha vitiation, details of prodromal symptoms and clinical features etc.
- Pratyaksha Pariksha is the method where Indriya of the person is used to perform the examination. Rasanendriya Pariksha is the type of Pariksha which should be performed by Anumana (inference) Pariksha.
- The status of Agni, the status of physical strength, status of functioning of Indriyas, status of functioning of Manas etc should be assessed with the help of Anumana (inference) Pariksha.

Probable questions may be asked in the examination

Long essays

- Define Pariksha and explain Aptopadeshadi Trividha Pariksha
- Explain Trividha Pariksha
- Trividha Pariksha
- Define Pariksha and explain Aptopadesha Parisha as explained by Charaka
- Explain Pratyaksha Pariksha in detail with examples
- Explain Anumana Pariksha with suitable examples
- Explain the importance of Aptopadeshadi Trividha Pariksha and Shadvidha Pariksha with examples

Short essays

- Explain 'Gudha Lingam Vyadhim.....'
- Explain 'Parikshyakarino hi kushala bhavanti'
- Explain Pratyaksha Pariksha
- Explain Bala Parikshana Vidhi

Short answers

- Explain Agni Pariksha
- Explain Anumana
- Explain in brief Aptopadesha
- Pratyaksha Pariksha
- Rasanendriyatah Pariksha explain in brief
- Define Pariksha

- Write the importance of Pariksha
- Explain 'Ayushah Kshayam Arishtaih ...'

MCQs

1. **The Pratyaksha Pariksha which will be done with Anumana is**
   a. Shrotrendriya Pariksha;
   b. Rasanendriya Pariksha;
   c. Ghranendriya Pariksha;
   d. Sparshanendriya Pariksha
   Answer -(b)
2. **The assessment of Krodha can be done by**
   a. Sanga;
   b. AVigyana;
   c. Abhidroha;
   d. Abhipraya
   Answer -(c)
3. **Namagrahana is the tool used to assess**
   a. Dvesha;
   b. Samjna;
   c. Shraddha;
   d. Shoka
   Answer -(b)
4. **Antrakujana is being assessed by**
   a. Pratyaksha;
   b. Anumana;
   c. Aptopadesha;
   d. Yukti
   Answer -(a)
5. **Dhairya is being assessed by**
   a. Amoda;
   b. Avishada;
   c. Avibhrama;
   d. Abhipraya
   Answer -(b)

***

Darshanadi Trividha Pariksha

2

Learning objectives

- ⇨ To know the term of Darshanadi Trividha Pariksha
- ⇨ To know the textual description of Darshanadi Trividha Pariksha
- ⇨ To understand relevance of Darshanadi Trividha Pariksha in current era

This description is available in 1st chapter of *Sutrasthana* of *Ashtanga Hridaya* and *Ashtanga Sangraha*. *Darshanadi Trividha Pariksha* includes three modes of examination namely, *Darshana* (examining the patient with eyes), *Sparshana* (palpation of the patient with hand) and *Prashna Pariksha* (interrogation of the patient regarding their illness). Now each type of *Pariksha* will be discussed in detail.

Terms and textual descriptions of Darshanadi Trividha Pariksha

Darshana Pariksha:

दर्शनेन दृष्ट्या, कासमेहाद्यार्तेषु पीतशुक्लवर्णसस्थान प्रमाणोपचयच्छायाविण्मूत्रच्छर्दितादिकम्।

A.Hr.Su. 1/22, Arunadatta commentary

Darshana Pariksha: This type of *Pariksha* (examination) is performed with the help of eyes of the clinician. In case of *Kasa*, one has to look for the colour of the sputum watery (*Vata Pradhana*), yellowish (*Pitta Pradhana*) or whitish (*Kapha Pradhana*) in colour. In case of *Prameha*, the discolouration of *Mutra* helps in the evaluation of *Dosha Pradhanya* in *Prameha*.

As far as *Samsthana* or clinical features are concerned, the presence of *Svayathu* in *Sandhi* helps in the diagnosis of *Amavata* or *Sandhivata* or *Kroshthukashirsha*.

***Pramana*–** This refers to the measurement of the body parts or amount of the different body fluids regarding its normalcy or abnormalcy. In case of *Atidirgha* person, the person will be having extreme height. In case of *Prameha*, the person will be passing large amount of urine in a day. In case of *Atisara*, the person will be having increased amount of liquid or semiliquid stools.

***Upachaya*–** refers to assessment of nutrition. In case of *Atisthoulya*, the person will be having over nutrition. In case of *Atikarshya*, the person will be having low nutrition. This particular aspect of assessment is done by doing *Samhanana Pariksha*. *Samhanana Pariksha* includes the assessment of *Suvibhakta Asthi* and *Sandhi* (proper division of bones and joints), *Sunivishta Mamsa* (proper development of *Mamsa*) etc are helpful in deciding the *Upachaya*.

***Chaya* (lustre)–** in the patients who are suffering from *Atisara* (excess passage of liquid stools for more than 30 times), we can observe the lack of lustre.

Colour of *Vit*, *Mutra* and *Chardi*– colour of faecal matter, urine and vomitus will help in deciding the *Dosha Pradhanya*. The presence of yellowish discolouration of vomitus implies that there is *Pitta* dominance in the patient. The presence of dark coffee ground vomitus suggests the *Vata* dominance in the patient.

Sparshana Pariksha

स्पर्शनेन हस्तकाय स्पर्शेन, ज्वरगुल्मविद्रध्याद्यार्तम्, तथा शीतोष्णस्तब्धस्पन्दश्लक्ष्णखरस्पर्शादिक च।

A.Hr.Su. – 1/22, Arunadatta

Sparshana Pariksha refers to the examination of the patient with the hand of the clinician. The examination includes the examination of the patient in *Jvara* (raised body temperature), *Gulma* (palpable swelling in the abdominal region), *Vidradhi* (presence of pus collection in any part of the body)

Various sensations such as *Shita* (cold), *Ushna* (hot sensation), *Spandana* (abnormal pulsations) in the patients suffering from *Vatashonita* (spectrum of diseases afflicting the *Rakta* and vitiation of *Vata* is observed), *Stabdhata* (stiffness) in the patients suffering from *Vatavyadhi* (spectrum of diseases where in abnormal increase of *Vata Dosha* is seen), *Shlakshnatva* (sliminess), *Kharatva* (roughness) in the patients suffering from *Kushtha* (set of skin diseases) come under the *Sparshana Pariksha*.

Prashna Pariksha

प्रश्नेन पृच्छया, शूलारोचकच्छर्दिहृर्दत्व सुच्छन्द-
दुश्छन्दत्व मृदुक्रूरकोष्ठता स्वप्नदर्शनमभिप्रायं
जन्मामयपवृत्तिनक्षत्रद्विष्टेष्टसुखदुखानि च, इत्यातुर-
मुखात्परीक्षेत। A.Hr.Su. – 1/22, Arunadatta

The *Prashna Pariksha* includes the interrogation of the patient. The interrogation includes regarding the inquiry related to the

- ⇨ Description of Sula (pain). For example, a person presented with burning sensation associated with pain in the epigastrium worsening in the midnight suggests the involvement of *Pitta Dosha* in the body. Pricking type of pain always suggests the dominance of *Vata Dosha* in the process of pathogenesis.
- ⇨ *Arochaka* (tastelessness), implies the involvement of *Pranavata*, *Rasa Dhatu* in the pathogenesis
- ⇨ Chchardi (vomiting). For example, the patient presented with yellowish vomiting with bitter taste suggests the dominance of *Pitta Dosha* in the pathogenesis
- ⇨ *Hridardatva* (discomfort in the region of *Hridaya*), *Succhanda* and *Duschanda* (modifying factors both aggravating and relieving factors), *Mridu* and *Krura Koshthata* (nature of defaecation), *Swapna Darshana* (nature of dreams), *Abhipraya* (opinion of the patient regarding his illness), *Janma* (place of birth place, place of the onset of the illness and place where the aggrevation of the illness has occurred) and *Amaya Pravritti* (nature of the illness), *Nakshatra* (astrological aspect of the individual), *Dvishteshta Sukha* and *Dukha* (liking and dislikings of the patient)

Understanding the relevance of Darshanadi Trividha Pariksha in current era

- ☐ Let us take the example of *Janma* (birth). In this example, we have to take *Atura Janma Sthana*) the place of birth, *Vyadhi Janma Sthana* (place of onset of disease) and *Vyadhi Vardhana Sthana* (place of aggrevation of disease). 26 years old individual takes birth in *Anupa Desha* and develops *Kapha Pradhana Vikara* in *Anupa Desha* and progression of the disease also occurs in *Anupa Desha* then such disease is considered to be very difficult to cure or takes longer time to get cured. The reason for this could be the age of the individual which is *Kapha* dominant; place of the birth, place of disease onset and progression also favours the vitiation of *Kapha Dosha*.
- ☐ Let us take another example of *Amaya Pravritti* or nature of the illness. Suppose 35 years old individual who is having the occupation of coolie worker develops headache around 11 am which persists throughout the day, then we may predict the dominance of *Pitta Dosha* in the patient. The evidence to predict the *Pitta Dosha* in the body is the timing of onset of the disease and the age of the patient and exposure to sunlight in middle of the day. If the patient receives the management for

the pacification of *Pitta*, the patient will get the relief.

- ☐ Let us take the example of assessment of *Koshtha*, the presence of *Mridu Koshtha* indicates the patient is having *Pitta Prakriti* and presence of *Krura Koshtha* indicates the *Vata Prakriti* of the patient. This knowledge helps in deciding the dose of the medicine to get the desired result. To get the *Anulomana* effect in *Mridu Koshtha*, mild dose of medicine is required whereas in *Krura Koshtha*, we need stronger dose of medicine for the desirable result.
- ☐ Let us take another example of description of *Kasa* (cough and its associated features), if 24 years old individual presented with cough with yellowish coloured sputum along with fever, it indicates the individual is suffering from *Pitta* dominant disease. The whole description implies that the patient is showing the involvement of *Pranavaha* and *Rasavaha Srotas*. Thus, to have the complete cure from the illness, one should concentrate on correction of *Pranavaha* and *Rasavaha Srotas* along with pacification of *Pitta*.
- ☐ Thus, all three modes of *Rogi Pariksha* will be helpful in deciding the actual stage of the disease, prognosis and to plan the appropriate line of management.

Chapter Resources

1. Ashtanga Hridaya and Ashtanga Sangraha excerpts

Key points of the chapter

- This method of Trividha Pariksha is explained in 1st chapter of Sutra Sthana of Ashtanga Hridaya and Ashtanga Sangraha.
- In Darshana Pariksha, we are going to inspect the diseased individual, in Sparshana Pariksha, we are going to do the palpation and in Prashna Pariksha, we are going to interrogate the patient regarding the nature of the illness.

Probable questions may be asked in the examination

Long essays

- Define Pariksha and explain Darshanadi Trividha Parisksha
- Define Pariksha and explain Darshanadi Trividha Pariksha with suitable examples

Short essays

- Explain Darshana Pariksha
- Explain Sparshana Pariksha
- Explain Prashna Pariksha as per Vagbhata
- Trividha Pariksha

Short answers

- Write a short note on Darshanadi Trividha Pariksha
- Write a short note on Darshana Pariksha
- Write a short note on Sparshana Pariksha
- Write a short note on Prashana Pariksha as per Vagbhata

MCQs

1. **The analysis of Arochaka is being done by**

   a. Darshana;
   b. Sparshana,
   c. Prashna;
   d. All of the above

   Answer -(c)

2. **Kharatva of the body is being assessed by**

   a. Darshana;
   b. Sparshana;
   c. Prashna;
   d. All of the above

   Answer -(b)

3. **Pitatva of Mutra is being assessed by**

   a. Darshana;
   b. Sparshana;
   c. Prashna;
   d. All of the above

   Answer -(a)

4. **Darshanadi Trividha Pariksha is the contribution of**

   a. Charaka;
   b. Sushruta;
   c. Vagbhata;
   d. Yoga Ratnakara

   Answer -(c)

5. **Vagbhata has mentioned which of the following type of Pariksha?**

   a. Shadvidha Pariksha;
   b. Darshanadi Trividha Pariksha;
   c. Aptopadeshadi Trividha Pariksha;
   d. Chaturvidha Pariksha

   Answer -(b)

***

3

Chaturvidha Pariksha

Learning objectives

- ⇨ Meaning of Chaturvidha Pariksha
- ⇨ What is meant by Yukti?
- ⇨ Relevance of Yukti in Roga Nidana and Vikriti Vigyana

In this type of *Pariksha*, 4 types of *Pariksha* are included. They are *Pratyaksha*, *Anumana* and *Aptopadesha* and *Yukti*. The first three are described in detail in *Aptopadeshadi Trividha Pariksha*. The fourth one will be discussed in detail.

4-fold examination is mentioned for the examination of existing and non-existing things by *Charaka – Aptopadesha* (authoritative testimony), *Pratyaksha* (direct observation), *Anumana* (inference) and *Yukti* (logical reasoning).

The intellect perceives the unknown factors which are produced by multiple causes. This occurs due to the comparison of unknown factors with the known cause-effect relationship. With this, one can have the knowledge of past, present and future days at a particular time.

We have already learnt the concept of *Aptopadesha*, *Pratyaksha* and *Anumana* in earlier chapter entitled *Aptopadeshadi Trividha Pariksha*. In this section, we are going to have explanation about *Yukti Pariksha*.

बुद्धिः पश्यति या भावान् बहुकारणयोगजान्।
युक्तिः त्रिकाला सा ज्ञेया त्रिवर्गः साध्यते यया॥

च.सू. 11/25

- ⇨ *Yukti* is a type of *Chaturvidha Pariksha*
- ⇨ By the help of *Yukti*, the clinician can identify the multiple causes of the disease
- ⇨ With the help of *Yukti*, past, present and future of a disease can be predicted accurately
- ⇨ With the help of *Yukti*, *Dharma*, *Artha* and *Kama* can be achieved at appropriate time

Relevance of Yukti in Roga Nidana and Vikriti Vigyana

- ⇨ 35 years male individual known alcoholic from past 4 years is presented with yellowish discolouration from past 7 days; pain in the right hypochondriac region from past 10 days; not associated with fever, the clinician should predict the possibility of hematemesis in the coming days. In this example, the probable diagnosis could be *Kumbhakamala*. This is the present situation. The prediction of occurrence of hematemesis is the prediction of the outcome of the present situation.
- ⇨ 40 years old male individual presented with pain abdomen along with fullness of abdomen following heavy meal which consisted of *Rasam* and rice and *Payasa* prepared out of milk (special sweet dish prepared out of milk, rice, sugar etc) since 1 day evening. This is followed by vomiting after 30 minutes. This is followed by heaviness of the abdomen. In this situation, the probable diagnosis could be *Alasaka*. After consuming warm saline water, immediately the patient had vomiting thrice and the patient became almost alright. In this situation, when the clinician makes the diagnosis of *Alasaka*, then only the probable line of treatment i.e. *Ullekhana* can be predicted. Like this, the concept of *Yukti* will be helpful in predicting the prognosis of the disease as well as appropriate line of treatm

Chapter Resources

1. Charaka Samhita excerpts

Key points of the chapter

- ⇨ This method of Pariksha is explaind in Charaka Samhita. The four folds of Rogi Pariksha are Aptopadesha, Pratyaksha, Anumana and Yukti. Aptopadesha, Pratyaksha and Anumana are explained in the context of Aptopaeshadi Trividha Pariksha.
- ⇨ Yukti is helpful in identifying multiple causative factors of disease. Yukti is also helpful in predicting the past, present and future of a disease. Yukti is also helpful in achieving Dharma, Artha and Kama at appropriate time.

Probable questions may be asked in the examination

- ⇨ The questions mentioned under long essays, short essays and short answers in the context of Aptopadeshadi Trividha Pariksha can also be included in this section too.

Long essays

- ⇨ Define Pariksha and explain Chaturvidha Pariksha as per Charaka with examples

Short essays

- ⇨ Explain Yukti Pariksha with clinical examples

Short answers

- ⇨ Define Yukti Pariksha
- ⇨ Write a short note on Yukti Pariksha

MCQs

1. **Chaturvidha Pariksha is the contribution of**
   a. Charaka;
   b. Sushruta;
   c. Vagbhata;
   d. Yoga Ratnakara
   Answer -(a)
2. **In a patient suffering from ascites due to alcoholic cirrhosis, which of the following indicates previous history of the disease?**
   a. Shrinkage of liver;
   b. Huge abdominal swelling;
   c. Vomiting of blood;
   d. Bleeding per rectum
   Answer -(a)
3. **Which of the following is included in Charakokta Chaturvidha Pariksha?**
   a. Pratyaksha, Anumana, Aptopadesha, Yukti;
   b. Darshana, Sparshana, Prashna, Yukti;
   c. Pratyaksha, Anumana, Aptopadesha, Upamana;
   d. None of the above
   Answer -(a)
4. **Chaturvidha Pariksha is explained in .... Sthana of Charaka Samhita.**
   a. Sutra;
   b. Vimana;
   c. Sharira;
   d. Nidana
   Answer -(a)
5. **Which of the following is not explained by Charaka Samhita?**
   a. Aptopadeshadi Trividha Pariksha;
   b. Chaturvidha Pariksha;
   c. Dashavidha Pariksha;
   d. None of the above
   Answer -(d)

***

Shadvidha Pariksha

4

Learning objectives

1. The meaning of Shadvidha Pariksha
2. What are the factors included in Shadvidha Pariksha
3. The detailed explanation of Prashna Pariksha
4. Relevance of Prashna Pariksha in diagnosis of the disease

प्रश्नेन च विज्ञानीयाद्देशं काल जातिं सात्म्यमातङ्कसमुत्पत्तिं
वेदनासमुच्छ्रायं बलमन्तरग्निं वातमूत्रपुरीषाणां
प्रवृत्यप्रवृत्ती कालप्रकर्षादींश्च विशेषान्।
आत्मसदृशेषु विज्ञानभ्युपायेषु तत्स्थानीयैर्जानीयात्॥5॥

Su.Su. – 10/5

The term *Shadvidha Pariksha* refers to the six folds of examination of the patient. These include *Panchendriya Pariksha* and *Prashna Pariksha*.

1. ***Shrotrendriya Pariksha*** (factors to be examined with the help of ears of the clinician)
2. ***Sparshanendriya Pariksha*** (factors to be examined with the help of touch sense of the clinician)
3. ***Chakshurindriya Pariksha*** (factors to be examined with the help of eye of the clinician)
4. ***Rasanendriya Pariksha*** (factors to be examined by inference)
5. ***Ghranendriya Pariksha*** (factors to be examined by the nose of the clinician)
6. ***Prashna Pariksha*** (factors to be analysed by interrogation of the patient by the clinician)

First five methods of examinations are explained under the heading of *Trividha Pariksha* in the context of *Pratyaksha Pariksha* as described by *Charaka Samhita*. That is the reason, in this section, we are not going to discuss these five types of *Pariksha*. In this section, we are going to discuss the *Prashna Pariksha* which is unique to *Sushruta Samhita*.

***Prashna Pariksha*:** The points to be assessed during interrogation are – place of the patient, time or season of the first appearance of the disease, the caste which the patient belongs to; things or measures which tend to bring about a manifest amelioration of disease or prove comfortable to the patient; cause of the disease, aggrevation of the pain, strength of the patient, digestive power, proper or improper elimination of flatus, faeces and urine; maturity of the disease with regards to the time.

***Desha*:** As per *Dalhana*, *Desha* is of 3 types - *Jangala*, *Anupa* and *Sadharana*. The same is being opined earlier by the *Brihatrayi*. In *Jangala Desha*, there will be *Vata* dominant diseases are more commonly observed and in *Anupa Desha*, *Kapha* dominant diseases are commonly seen and in *Sadharana Desha*, there is no such occurrence of the diseases. By the word *'Desha'* we can understand the site where the patient born, grown up and got disease, by which the *Nidana* can be assessed. This will be helpful in deciding the plan of management and planning of the preventive measures in the form of *Pathya* and *Apathya*.

According to another opinion, *Desha* is of 2 types – *Bhumidesha* and *Aturadesha*. In case of *Aturadesha*, one has to consider the following factors – i.e. site of *Dosha Chaya*, *Prakopa* etc. The assessment of *Bhumidesha* can be done by assessing the nature of food consumption of the people of that particular locality, life style pattern etc. This assessment will be useful in modifying the pattern of food intake and life style, so that the speedy recovery can be attained. The assessment of *Aturadesha* is helpful in deciding the extent of *Dosha Prakopa* – localised or generalised, extent of involvement of *Dushya* depending upon the localised or generalised symptoms, extent of involvement of *Srotas*, nature of Agni, involvement of *Rogamarga* etc. The knowledge of this is useful in deciding the prognosis of the disease in an individual.

After considering the birth place, site where the patient has grown and place where he got the disease, one has to enquire with the patient or relative about the dietary habits, culture, regimens in that area; strength, mental strength, homologation and habits of the people of that area, the aggravating and unwholesome and relieving factors for those diseases in that area. The proper understanding of above said factors is possible by thorough *Desha Pariksha*. Accordingly, the assessment of *Dosha* and disease and proper plan of management can be done satisfactorily.

***Kala*:** According to *Dalhana*, *Kala* is of 2 types – *Nityaga* and *Avasthika*. *Nityaga* refers to *Shadritu*. *Avasthika* is having two meanings in healthy people and diseased individuals. In six *Ritu*, there will be natural variation in *Dosha* in different seasons. While diagnosing the disease, this fact has to be kept in mind. In healthy people, in case of *Balyavastha*, *Kapha Dosha* is predominant and in middle aged individuals, *Pitta Dosha* is predominant and in elderly people *Vata Dosha* is dominant. Whereas *Avasthika* in diseased individuals, *Dosha* dominance may vary depending upon the disturbance of the *Dosha* vitiation, involvement of *Dushya*, involvement of *Srotas*, status of the *Agni* etc.

The facts mentioned above can be gathered by interrogation with the patient or the person who accompanies him. The knowledge of this is not only helpful in proper examination and treatment, but also for the maintenance of the health.

***Jati*:** In olden days, occupation was closely associated with caste of the person. Nowadays, there is no relation with the caste and the occupation of the patient. In *Ayurveda*, the following persons are said to be diseased always - *Brahmana*, servant to the king, commercial sex worker and merchant, because they cannot follow the proper diet and regimen in appropriate time. Nowadays, certain diseases are very specific to certain occupations. E.g. the people working in asbestos factories, are more likely to develop asbestosis. The knowledge of this is thus helpful in diagnosis and proper management.

***Satmya*:** The diet, regimen, medicine, place, time etc which are wholesome or comfortable to the patient by continuous intake is termed as *Satmya* to that person. Even in some factors which are not habituated to that person by birth, if he consumes continuously for a long time, becomes *Satmya* to that person (*Okasatmya*) like intake of *Ahiphena*, *Bhanga* and other intoxicating agents. The persons who consume milk, ghee, meat soup, food substances having all six *Rasa* will have strong resistance power and they won't suffer from any disease in most times and if they suffer from any disease, then that will be easily cured. If the persons habituated to dry, pungent food substances and food stuffs having one *Rasa* usually get diseases very oftenly and that too very difficult to cure. The persons who are habituated to alcohol, *Pitta* is likely to get vitiated and they are prone to disorders of *Yakrit* and *Pliha*, *Raktavaha Srotomula*. If the persons are chronic chain smokers, they are more prone to respiratory diseases (*Pranavaha Srotovikara*). Thus, the knowledge of *Satmya* of a person is helpful in deciding the prognosis of the disease.

***Atanka Samutpatti* and *Kala Prakarsha*:** *Atanka Samutpatti* refers to the onset of the disease and *Kala Prakarsha* refers to the duration of the illness which should be asked to the patient or person accompanying him. The knowledge of this is helpful in assessing the strength of the disease and planning the treatment. For example, in case of *Visarpa*, the onset of the disease is sudden and rapidly progressive i.e. *Ashukari*. In case of *Prameha*, the duration of the illness is prolonged (*Chirakari*) and in case of *Kushtha*, the duration of the illness is prolonged.

Vedana Samucchraya: refers to the descriptions of the symptoms e.g. type of pain etc. This will help in the assessment of the type of *Dosha Prakopa* based on the site and character of the symptom. *Toda* (pricking type of pain), *Bheda* (tearing type of pain), *Ccheda* (cutting type of pain), reduced sensation and tingling sensation are mainly due to the vitiation of *Vata Dosha*; *Osha* (burning sensation in the sides of the chest), *Chosha* (mild burning sensation), *Daha* (burning sensation all over the body), *Amlaka* (sour taste in the mouth) are due to vitiation of *Pitta*; *Gourava* (heaviness), *Staimitya* (feeling of wet cloth covering the body), *Kandu* (itching) are due to the vitiation of *Kapha Dosha*.

Bala: the degree of physical and mental strength can be assessed by interrogation and by this we will be able to know about the patient's resistance power and power of withstanding the potency of the medicine and prognosis of the disease.

Agni: *Jatharagni* is the origin for all other *Agni*. If it is proper, then it nourishes other *Dhatvagni* and *Bhutagni* which are responsible for the stable physical growth. While interrogating the patient, one has to enquire about the digestive power at birth, recent change in the digestive power, the type of food substance which causes indigestion; the type of food stuffs causing altered functions of *Samagni* into *Vishamagni*, *Mandagni* or *Tikshnagni*.

Vatamutrapurishanam Pravritti and Apravritti: The knowledge of proper or improper evacuation of faeces, urine, belching, menstruation can be attained by interrogation itself. This information will be helpful in deciding the normal and abnormal functions of the *Dosha*, *Dhatu* and *Mala* in the body, normal function of *Ahara Parinama* in the body. The interrogation regarding the appearance of blood, pus in semen etc can be included in this particular point. For example, if the person is suffering from *Atisara*, there will be increased frequency of passage of liquid or semisolid stools suggestive of abnormal function of *Apana Vata*.

The relevance of Shadvidha Pariksha in Roga Nidana

- ⇨ Based on the context of *Agni*, let us assume that 26 years old male individual is having *Tikshnagni* is consuming more amount of pickle from past 1 year, then we can infer that he is having vitiation of *Pitta Dosha* in the same individual. That means the person is likely to get *Pitta* dominant disease in future.
- ⇨ Let us take the context of *Bala*. If 30 years old individual is an athlete and if the same person gets breathlessness on exertion on running 100 metres, then we have to consider he is having *Avara Vyayamashakti*. If 35 years old individual who is a shopkeeper by profession, and if the same individual gets breathlessness on exertion on running 100 metres, then it is not considered as *Avara Vyayamashakti*, it can be considered as *Madhyama* or *Pravara Vyayamashakti* depending upon the physical signs observed after the exercise.
- ⇨ Let us take the context of *Purisha* and *Mutra Pravritti* and *Apravritti*, if 55 years old male individual having the occupation of heavy vehicle driving for long distance is presented with complaint of constipation, then we can infer that the probable cause of the presenting complaint could be frequent suppression of urge of defecation.

Chapter Resources

1. Sushruta Samhita, Ashtanga Hridaya and Ashtanga Sangraha

Key points of the chapter

- ⇨ Shadvidha Pariksha is the contribution of Sushruta. It is explained in 10th chapter of Sutra Sthana. It includes Panchendriya Pariksha and Prashna Pariksha. Panchendriya Pariksha is explained in detail in the context of Pratyaksha Pariksha.
- ⇨ In Prashna Pariksha, the factors to be interrogated are place of the patient, time or season of first appearance of the disease, the caste in which the patient belongs to, things or measures which tend to bring about a manifest amelioration of disease or prove comfortable to the patient; cause of the disease, aggravation of pain, strength of the patient, digestive power, proper or improper elimination of flatus, faeces and urine etc.

Probable questions may be asked in the examination

Questions mentioned long essays, short essays and short answers sections in the context of Pratyaksha Pariksha of Aptopadeshadi Trividha Pariksha and Prashna Pariksha of Vagbhata can also be considered in this section too.

Long essays

- ⇨ Define Pariksha and explain Prashna Pariksha as per Sushruta with examples
- ⇨ Explain Shadvidha Pariksha as per Sushruta in detail
- ⇨ Explain the importance of Aptopadeshadi Trividha Pariksha and Shadvidha Pariksha with examples.
- ⇨ Describe different types of Rogi Pariksha in detail. Discuss vividly Shadvidha Rogi Pariksha in detail. Discuss the importance of Rogi Pariksha.

Short essays:

- ⇨ Shadvidha Pariksha as per Sushruta
- ⇨ Explain Sushrutokta Prashna Pariksha

Short answers

- ⇨ Sushrutokta Shadvidha Pariksha
- ⇨ Prashna Pariksha as per Sushruta
- ⇨ Koshtha Pariksha
- ⇨ Antaragni Pariksha

MCQs

1. **Vata dominant diseases are seen in**
   a. Jangala Desha;
   b. Sadharana Desha;
   c. Anupa Desha;
   d. None of the above
   Answer -(a)
2. **Mandagni is usually seen in ---------- Prakriti individuals.**
   a. Vata;
   b. Pitta;
   c. Kapha;
   d. Sama Prakriti
   Answer -(c)
3. **Prashna Pariksha is mentioned in**
   a. Sushruta Samhita;
   b. Ashtanga Hridaya;
   c. Both 1 and 2;
   d. None of the above
   Answer -(c)
4. **Pacification of Pitta occurs naturally in ------------Ritu.**
   a. Sharat Ritu;
   b. Hemanta Ritu;
   c. Shishira Ritu;
   d. Varsha Ritu
   Answer -(b)
5. **Staimitya (feeling of wet cloth covering the part or whole body) is the symptom observed in ----------- Dosha Prakopa.**
   a. Vata;
   b. Pitta;
   c. Kapha;
   d. None of the above
   Answer -(c)

***

Ashta Sthana Pariksha

5

Learning objectives

- ⇨ To know the exact meaning of Ashta Sthana Pariksha
- ⇨ What are the factors included in Ashta Sthana Pariksha
- ⇨ To know the available descriptions of Ashta Sthana Pariksha
- ⇨ To know the relevance of Ashta Sthana Pariksha

रोगाक्रान्त शरीरस्य स्थानान्यष्टौ परीक्षयेत्।
नाडीं मूत्रं मलं जिह्वां शब्दं स्पर्शं दृगाकृतिः॥ Yo. Ra.

This description is available in *Yoga Ratnakara*. If a clinician comes across with the diseased individual, he has to do the examination in eight folds. They are

1. ***Nadi Pariksha*** (the assessment of *Nadi*)
2. ***Mutra Pariksha*** (the assessment of urine)
3. ***Mala Pariksha*** (the assessment of fecal matter)
4. ***Jihva Pariksha*** (the examination of tongue)
5. ***Shabda Pariksha*** (the examination of voice)
6. ***Sparsha Pariksha*** (the examination of skin)
7. ***Drik Pariksha*** (the examination of the eyes)
8. ***Akriti Pariksha*** (the examination of physical characters)

***Nadi Pariksha*:** (examination of *Nadi*)

Most of the individuals who have come across the term *Nadi*, consider it as radial pulse examination. It is not so in particular.

- ⇨ When pulse examination is concerned, it is only giving us the information about rate, rhythm, volume, texture, condition of the arterial wall, equality of both radial pulses, radio femoral delay.
- ⇨ When the assessment of *Nadi* is done, it gives us the dominance of *Dosha* in the individual at that particular point of time, even the subtype of *Dosha* involved in the disease manifestation can be identified, involvement of *Dhatu* in the diseased individual and *Prakriti* of the individual. In other words, if the clinician is well versed in the assessment of *Nadi*, we can analyse the total derangements of vitiated *Dosha* and *Dhatu* accurately.
- ⇨ In the coming pages, we are going to see the descriptions told in *Yoga Ratnakara*, regarding the method of assessment of *Nadi* in those days.

Synonyms of Nadi

स्नायुर्नाडी ततो हंसी धमनी धरणी धरा।
तन्तुकी जीवनज्ञाना शब्दाः पर्यायवाचकाः॥ Yo. Ra.

Snayu, Hamsi, Dhamani, Dharani, Dhara, Tantuki, Jivanajnana are the synonyms of *Nadi* as per *Yoga Ratnakara*.

Method of examination of Nadi

नाडीमङ्गुष्ठमूलाधः स्पृशेद्दक्षिणगे करे।
ज्ञानार्थं रोगिणो वैद्यो निजदक्षिणपाणिना॥
स्थिरचित्तः प्रशान्तात्मा मनसा च विशारदः।
स्पृशेदङ्गुलिभिर्नाडीं जानीयात् दक्षिणे करे॥

प्रायः स्फुटिता भवति वामकरे वधूनां पुंसां च दक्षिणकरे तदियं परीक्षा।
ईषद्विनामितकरं वितताङ्गुलीकं बाहुं प्रसार्य रहितं परिपीडनेन॥
ईषविनम्रकृतकूर्परवामभागे हस्ते प्रसारितसदङ्गुलिसन्धिके च।
अङ्गुष्ठमूलपरिपश्चिमभागमध्ये नाडीं प्रभातसमये प्रहरं परीक्ष्य॥
वारत्रयं परीक्षेत धृत्वा धृत्वा विमोचयेत्।
विमृश्य बहुधा बुद्ध्या रोगव्यक्तिं विनिर्दिशेत्॥ Yo. Ra.

- ⇨ The examination of *Nadi* should be performed by using the right hand of the clinician or examiner.
- ⇨ Three fingers should be kept such that the index finger should be below the root of the right thumb.
- ⇨ While doing the assessment of *Nadi*, the clinician should be of stable mind, calm mind, should be skilled in the assessment of *Nadi*.
- ⇨ In case of female patients, left hand should be used and in case of male patients, right hand of the patient should be used while the assessment of *Nadi*.
- ⇨ The fingers of the hand should be extended and wrist joint should be slightly flexed, flexion of the elbow should be done.
- ⇨ The examination of *Nadi* should be done in the morning and the duration of the *Nadi* should be for one *Prahara* (approx. 3 hours)
- ⇨ Examination of *Nadi* should be done thrice with frequent release of the examining fingers.

Dosha dominance in the assessing fingers

अग्रे वातवहा नाडी मध्ये वहति पित्तला।
अन्ते श्लेष्मविकारेण नाडी ज्ञेया बुध सदाः॥ Yo. Ra.

- ⇨ If the pulsations felt by the index finger, it implies the dominance of *Vata Dosha*.
- ⇨ If the pulsations felt by the middle finger, it implies the dominance of *Pitta Dosha*.
- ⇨ If the pulsations felt by the ring finger, it implies the dominance of *Kapha Dosha*.

Depiction of Doshaja Nadi and God

वातनाडी भवेत् ब्रह्मा पित्तनाडी च शंकरः॥
श्लेष्मनाडी भवेद्विष्णुस्त्रिदेवा नाडीसंस्थिताः। Yo. Ra.

It is stated that in each *Doshaja Nadi*, there will be residence of one God. Lord *Brahma* will reside in *Vataja Nadi*, Lord *Shankara* will reside in *Pittaja Nadi* and Lord Vishnu will reside in *Kaphaja Nadi*.

Contra Indications of Nadi Pariksha

सद्यःस्नातस्य भुक्तस्य तथा स्नेहावगाहिनः।
क्षुत्तृषार्तस्य सुप्तस्य नाडी सम्यक् न बुद्ध्यते॥ Yo. Ra.

In above situations, the *Nadi* assessment is not usually practiced. The reason could be change in the circulation of the blood through peripheral blood vessels. If one performs *Nadi Pariksha* soon after taking the bath, there may be a possibility of false increase in rate and if the clinician performs the *Nadi Pariksha* soon after getting up from bed after sleep, there may be a possibility of false decrease in rate. That is why, in these situations, *Nadi Pariksha* is not practiced.

- ⇨ ***Sadya Snata*** (the person who has taken bath or immediately after bath)
- ⇨ ***Bhukta*** (the person who has consumed food recently or immediately after food)
- ⇨ ***Snehana*** (immediately after internal or external *Snehana*)
- ⇨ ***Avagahana*** (immediately after tub bath)
- ⇨ ***Kshudha*** (when the person is having hunger)
- ⇨ ***Trishna*** (when the person is having thirst)
- ⇨ ***Supta*** (immediately after sleep)

Different forms of Nadi and dominance of Dosha

सर्पजलौकादिगतिं वदन्ति विबुधाः प्रभंजने नाडीम्।
पित्तेन काकलावकमण्डूकादेस्तथा चपलाम्॥

राजहंसमयूराणां पारावतकपोतयोः।
कुक्कुटस्य गतिं धत्ते धमनी कफसङ्गिनी॥
मुहुः सर्पगतिं नाडीं मुहुर्भेकगतिं तथा।
वातपित्तसमुद्भूतां तां वदन्ति विचक्षणाः॥
सर्पहंसगतिं तद्वद्वातश्लेष्मवतीं वदेत्।
हरिहंसगतिं धत्ते पित्तश्लेष्मान्विता धरा॥
काष्ठकुट्टो यथा काष्ठं कुट्टते चातिवेगतः।
स्थित्वा स्थित्वा तथा नाडीं सन्निपाते भवेत् ध्रुवम्॥ Yo. Ra.

Table 5.1: Form of Nadi and Dosha dominance

Form of Nadi	Dosha dominance
Nadi resembling Gati of Sarpa (serpent), Jalauka (leech)	Vata dominance
Nadi resembling Gati of Kaka (crow), Lavaka and Manduka (frog)	Pitta dominance
Nadi resembling Gati of Rajahamsa, Mayura (peacock), Paravata and Kapota (pigeon), Kukkuta (cock)	Kapha dominance
Nadi comprising of mixed Gati of Sarpa and Bheka	Vata Pitta dominance
Nadi comprising of mixed Gati of Sarpa and Hamsa	Vata Kapha dominance
Nadi comprising of mixed Gati of Hari and Hamsa	Pitta Kapha dominance
Nadi comprising of Gati resembling the speed of Kashthakutta (woodpecker) and slow Gati	Tridosha dominance

Specific situations and their effects on the assessment of Nadi

गंभीरा या भवेन्नाडी सा भवेन्मांसवाहिनी।
ज्वरवेगेन धमनी सोष्णा वेगवती भवेत्॥
कामक्रोधाद्वेगवहा क्षीणा चिन्ताभयप्लुता।
मन्दाग्नेः क्षीणधातोश्च नाडी मन्दतरा भवेत्॥
असृक् पूर्णा भवेत् सोष्णा गुर्वी सामा गरीयसी।
लघ्वी वहति दीप्ताग्नेस्तथा वेगवती मता॥
चपला क्षुधितस्यापि तृप्तस्य वहति स्थिरा।
मृत्युर्डमरुकस्येव भवेदेकदिनेन च॥
कंपते स्पन्दतेऽत्यन्तं पुनः स्पृशति चाङ्गुलीः।
तामसाध्यां विजानीयान्नाडीं दूरेण वर्जयेत्॥
स्थिरा नाडी भवेद्यस्य विद्युत् द्युतिरिवेक्ष्यते।
दिनैकं जीवितं तस्य द्वितीये मृत्युरेव च॥
शीघ्रा नाडी मलोपेता शीतला वाथ दृश्यते।
द्वितीये दिवसे मृत्युर्नाडी ज्ञेया विचक्षणैः॥
मुखे नाडी वहेत्तीव्रा कदाचित् शीतला वहेत्।
आयाति पिच्छिलः स्वेदः सप्तरात्रं न जीवति॥
देहे शैत्यं मुखे श्वासो नाडी तीव्रा विदाहवत्।
मासार्धं जीवितं तस्य नाडीविज्ञानभाषितम्॥
मुखे नाडी यदा नास्ति मध्ये शैत्यं बहिः क्लमः।
यदा मन्दा भवेन्नाडी त्रिरात्रं नैव जीवति॥
अतिसूक्ष्माऽतिवेगा च शीतला च भवेद्यदि।
तदा वैद्यो विजानीयाद्रोगिणं च गतायुषम्॥
विद्यादुन्नमिता नाडी दृश्यते च न दृश्यते।
अकालविद्युत्पातेन स गच्छेद्यमशासनम्॥
तिर्यगुष्णा च या नाडी सर्पगा वेगवत्तरा।
कफपूरितकण्ठस्य जीवितं तस्य दुर्लभम्॥
चैलांचलितवेगा च नासिकाधारसंयुता।
शीतला दृश्यते या च याममध्ये च मृत्युदा॥
दृश्यते चरणे नाडी करे नैवाभिदृश्यते।
मुखं विकसितं यस्य तं दूरं परिवर्जयेत्॥
वातपित्तकफाश्चापि त्रयो यस्यां समाहिताः।
कृच्छ्रसाध्यामसाध्यां वा प्राहुर्वैद्यविशारदाः॥
वक्रा च चपला शीतस्पर्शा वातज्वरे भवेत्।
द्रुता च सरला दीर्घा शीतपित्तज्वरे भवेत्॥
मन्दा च सुस्थिरा शीता पिच्छिला श्लेष्मतो भवेत्।
वक्रा च ईषच्चपला कठिना वातपित्तजा॥
ईषच्च दृश्यते स्पृष्टा मन्दा स्यात् श्लेष्मवातजा।
सूक्ष्मा शीता स्थिरा नाडी पित्तश्लेष्मसमुद्भवा॥
हंसगा चैव या नाडी तथैव गजगामिनी।
मुखं प्रशस्तं च भवेत्तस्याऽऽरोग्यं भवेत्सदा॥ Yo. Ra.

Table 5.2: showing special characters of Nadi and their effects on the body

Special characters of Nadi	Effects of Nadi
Pulse moves with one speed and volume upto 30 beats	The person survives in all situations
Pulse which moves with pauses	The condition is life threatening
If the pulse beats vary frequently, sometimes slow, sometimes sluggish, sometimes flickering with pauses or thin; sometimes found on shoulder then suddenly on fingers	Sannipata dominance or incurable in prognosis
If the pulse first moves like that of Pitta, then like that of Vata and then Kapha; which suddenly takes the circular course like being ridden on wheel, which becomes terrible, loses its normal movement and becomes thin	Incurable
If the pulse felt deep	Nadi carries Mamsa Dhatu
The pulse is hot and beats faster	Person is suffering from Jvara
The pulse is rapid	When the person is having Kama (lust) and Krodha (anger)
The pulse is thin or slower	Person is having Chinta (worry), Bhaya (fear)
The pulse is very slow	Person is having Mandagni (reduced digestive fire) or Kshina Dhatu (depleted body tissues)
The pulse is hot and heavy	The person is having fullness of blood in the vessels
The pulse is deep	The presence of Ama (undigested food material)
The pulse is light and fast	Good digestive fire
Pulse is flickering (not stable)	The person is having hunger
Pulse is smooth	The person is well fed
Pulse moves like a Damaru (hourglass shaped small drum) first throbbing then lost then again throbbing	Death of the person in one day
Pulse is having flickering, throbbing and then felt with fingers	The person should not be treated
If the pulse moves smoothly initially later beats fast like lightening	Death of the person in one day
If the pulse moves fast due to the vitiation of Dosha and later feels cold	Death of the person in the next day
If the first beat of the pulse is fast and sometimes cold associated with slimy sweating	Death of the person in 7 days
If the person's body is cold he breathes with mouth and pulse is fast and hot or has burning sensation	Death of the person in 15 days
If the first beat is not found, middle beat is cold and last beat is sluggish	Death of the person in 3 days
Pulse is irregular like lightning as it appears and disappears	Untimely death of the person like suddenly hit by thunder bolt
Pulse moves obliquely like snake, hot and very fast and whose throat is filled with phlegm	The person hardly survives
Pulse moves like a fluttering cloth, beats in accordance with the patient's breath and feels cold,	Person dies within 3 hours
The pulse felt on feet, not in hands and the person is having open mouth	The clinician should leave the patient from far away distance
On pulse examination, combinations of Vata, Pitta and Kapha are seen	Disease is hard to cure or incurable
Pulse is tortuous, tremulous and cold	Vata Pradhana Jvara
Pulse is fast, straight and elongated and not cold	Jvara of Pitta dominance
Pulse is slow, stable, feeling of cold	Jvara of Kapha dominance
Pulse moves like a swan or an elephant and face is cheerful	Definite cure from illness

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यो रोगिणः करं स्पृष्ट्वा स्वकरं क्षालयेद्यदि।
रोगास्तस्य विनश्यन्ति पङ्कः प्रक्षालनाद्यथा॥ Yo. Ra.

- ⇨ If the physician washes his hands after touching the patient's hand, the patient's ailments disappear as mud disappears by washing it.

Examination of radial pulse: The examination of radial pulse is an important and essential part of the examination. It affords valuable information about the condition of arterial walls, information regarding the state of the heart and circulation, valuable information regarding the detection and diagnosis of arrhythmias.

Method of examination: The pulse is usually felt at the wrist and over the radial artery, because of its superficial position and ease of palpability. In this, various parameters of pulse in relation to radial artery will be discussed, whereas discussion of other peripheral pulsations is done in the context of examination of cardiovascular system.

The characters of pulse noted are rate, rhythm, volume, force, equality, condition of arterial wall, radio-femoral delay and any abnormal characters of the pulse.

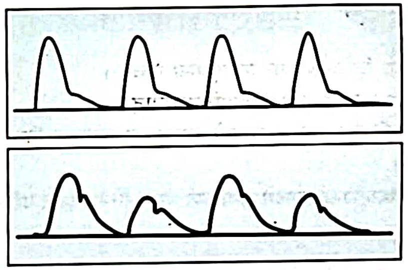
- ⇨ **Rate** – the pulse should be counted for one full minute. Normal pulse rate varies from 60 – 80 beats/ minute. The condition where pulse rate < 60 beats/ minute is termed as bradycardia and condition where pulse rate > 100 beats/ minute is termed as tachycardia. Usually, pulse rate corresponds heart rate, except in case of premature beats or atrial fibrillation, which is termed as pulsus deficit. In this situation, some of the heart beats are not recognised at the wrist at all.
- ⇨ **Rhythm**– usually, pulse at the wrist is usually regular in rhythm. An irregular pulse with an unequal spacing of the beats may be due to sinus arrhythmia, premature or ectopic beats or atrial fibrillation or atrial flutter and incomplete heart block.
- ⇨ **Volume**– the degree of expansion is displayed by an artery in between systolic and diastolic state of the heart. This is proportional to pulse pressure, depends on the state of contraction and relaxation of the arteries and force of the contraction of the heart.
    - ☐ **Hypokinetic pulse (weak pulse)**– in cases of low cardiac output such as shock, congestive cardiac failure, hypovolemia, cardiac tamponade, aortic outflow obstruction, mitral stenosis etc
    - ☐ **Hyperkinetic pulse (bounding pulse)**– in case of increased stroke volume or cardiac output such as anxiety, exercise, complete heart block, aortic regurgitation, anemia, thyrotoxicosis, hyperkinetic heart syndrome, beriberi, cirrhosis of liver etc
- ⇨ **Force**– the compressibility of a pulse or its force affords a rough measure of systolic blood pressure, and may be assessed in two ways:
    - ☐ The three middle fingers of the examiner's right hand being placed on the radial artery, the distal finger is kept firmly pressed to prevent the entry of blood from ulnar artery and proximal finger gradually compresses the artery above and middle finger is place with sufficient force over the artery to get the maximum pulsation of the radial artery. The force exerted by the proximal finger to obliterate the pulse under the middle finger is proportional to the systolic blood pressure.
    - ☐ In the second method, the clinician has to gradually compress the right brachial artery with right thumb, while palpating the radial artery on the same side with the fingers of the left hand. The degree of compression of brachial artery required to obliterate the radial pulse gives a fair measure of the systolic blood pressure.

- ⇨ **Equality**– usually radial, brachial, femoral and dorsalis pedis and posterior tibial pulsations are felt simultaneously on both sides. Inequality of the pulsations are observed in conditions such as aberrant course of radial artery, coarctation of aorta, dissecting aortic aneurysm or arteriosclerotic obstruction.
- ⇨ **Condition of the arterial walls** – normally artery is not palpable, an atherosclerotic vessel is either palpable either as a tubular structure or as tortuous structure.
- ⇨ **Radio -femoral delay** – this is observed in the patient suffering from coarctation of aorta.
- ⇨ **Abnormal characters of pulse** – such as bounding pulse seen in the patients of hyperthyroidism, pregnancy, severe anemia. Dicrotic pulse observed in the person suffering from dehydration, debilitating fevers, severe congestive cardiac failure etc. In pulsus alternans, there will be regular alteration in the size of the beats regularly placed as large and small pulsation which is seen in left ventricular failure, cardiac arrhythmias.

Mutra Pariksha

निशान्त्ययामे घटिका चतुष्टये उत्थाप्य वैद्यः किलः
रोगिणं च।
मूत्रं धृतं काचमये च पात्रे सूर्योदये तत्सततं परीक्षेत्॥
तस्याऽऽद्यधारां परिहृत्य मध्यधारोद्भवं तत्परिधारयित्वा।
सम्यक् परिज्ञाय गदस्य हेतुं कुर्याच्चिकित्सां सततं हिताय॥
Yo. Ra.

- ⇨ *Mutra* (urine) should be collected at the last *Yama* of *Ratri* (night), 4 *Ghatika* (96 minutes) before sunrise. One *Ghatika* refers to 24 minutes.
- ⇨ *Mutra* should be collected in glass vessel.
- ⇨ Examination of urine should be done after sunrise.
- ⇨ Initial stream of urine should be discarded and mid stream of urine should be collected for the assessment of *Mutra*.



Flowchart 5.1: Bounding pulse and Dicrotic pulse

Relation with colour of Mutra and Dosha dominance

वाते च पाण्डुरं मूत्रं सफेनं कफरोगिणः।
रक्तवर्णं भवेत्पित्ते द्वन्द्वजे मिश्रितं भवेत्॥
सन्निपाते च कृष्णं स्यादेतन्मूत्रस्य लक्षणम्। Yo. Ra.

Table 5.3: Colour of Mutra and Dosha dominance

Colour of Mutra	Dosha dominance
Pandu Varna (yellowish white)	Vata dominance
Saphena Mutra (frothy urine)	Kapha dominance
Rakta Varna (reddish discolouration of urine)	Pitta dominance
Mishrita Varna (mixed colour of urine)	Dvandva Dosha dominance
Krishna Varna (blackish discolouration of urine)	Sannipata Prakopa

As per another opinion, one more description is available regarding the Dosha dominance and colour and character of urine.

Table 5.4: Characters of urine and Dosha dominance

Characters of urine	Dosha dominance
Nila (blue) and Ruksha (dry)	Vata dominance
Pita (yellowish), Aruna (reddish) and Tailasama (consistency of oil)	Pitta dominance
Snigdha (unctuous) and Palvalavari (similar to the water of small pond)	Kapha dominance
Snigdha (unctuous), Ushna (hot) and Rakta Varna (reddish discolouration)	Rakta dominance

Taila Bindu Pariksha

परीक्षा विधिवत्कार्या रोगिमूत्रस्य तत्वतः।
तृणेन दापयेत्तैलबिन्दुं तत्रातिलाघवात्॥
विकासितं तैलमथाऽशु मूत्रे साध्यः स रोगी न विकसितं चेत्।
स्यात्कष्टसाध्यस्तलगे त्वसाध्यो नागार्जुनेनैव कृता परीक्षा॥

Yo. Ra.

- ⇨ Urine collected in the early morning should be examined after sunrise
- ⇨ Drop of *Tila Taila* should be dropped in the urine collected
- ⇨ Diagnosis and prognosis of the disease is decided on the basis of spreading and sinking nature of oil, direction of movement of oil, shape of oil seen in the surface of urine

Table 5.5: Tila Bindu Parischs

Spreading nature of oil in the urine	Prognosis
Quickly spreading in the upper layer of urine	Sadhya (curable)
Oil which is non spreading	Kashta Sadhya (curable with difficulty)
Oil which is sinking in the given urine sample	Asadhya (incurable)

Direction of movement of drop of Tila Taila and its significance

पूर्वांशां वर्धते बिन्दुर्यदा शीघ्रं सुखी भवेत्।
दक्षिणांशां ज्वरो ज्ञेयस्तथाऽऽरोग्यं क्रमाद्भवेत्॥
उत्तरस्यां यदा बिन्दोः प्रसरः संप्रजायते।
अरोगिता तदा नूनं पुरुषस्य न संशयः॥
वारुण्यां प्रसरेद्बिन्दुः सुखारोग्यं तदाऽऽदिशेत्।
ऐशान्यां वर्धते बिन्दुर्ध्रुवं मासेन नश्यति॥
आग्नेय्यां तु तथा ज्ञेयं नैऋत्यां प्रसरेद्यदि।
छिद्रितश्च भवेत्पश्चात् ध्रुवं मरणमेव च॥
वायव्यां प्रसरेद्बिन्दुः सुधयापि विनश्यति।

Yo. Ra.

Table 5.6: Direction of movement of drop of oil and prognosis of the

Direction of movement of drop of oil	Prognosis
East direction	Patient will be cured soon
South direction	Recovery from the disease is gradual
North direction	Recovery from the illness is undoubtedly certain
West direction	Recovery and happiness is definite
Eshanya (north east) direction	Death of the patient by one month
Agneya (south east) direction and holes appear on expanded oil	Death of the person is certain
Nairutya (south west) direction and holes appear on expanded oil	Death of the person is certain
Vayavya (north west) direction	Death is certain even if the person takes nectar or Amrita is given

Different shapes of oil and their significance

विकाशितं हलं कूर्मं सैरिभाकारसंयुतम्॥
करण्डमण्डलं चापि शिरोहीननरं तथा।
गात्रखण्डं च शस्त्रं च खड्गं मुशलपट्टिशम्॥
शरं च लगुडं चैव तथैव त्रिचतुष्पथम्।
बिन्दुरूपं नरो दृष्ट्वा न कुर्वीत क्रियां क्वचित्॥
हंसकारण्डताडागं कमलं गजचामरम्।
छत्रं वा तोरणं हर्म्यं सुपूर्णं दृश्यते यदि॥
आरोग्यता ध्रुवं ज्ञेया तदा कुर्यात्प्रतिक्रियाम्।
तैलबिन्दुर्यदा मूत्रे चालनीसदृशो भवेत्॥
कुलदोषो ध्रुवं ज्ञेयः प्रेतदोषसमुद्भवः।
नराकारं प्रजायेत किंवा स्यान्मस्तकद्वयम्॥
भूतदोषं विजानीयात् भूतविद्यां तदाचरेत्।
मातुलुङ्ग रसाभासं सौवीराभं जलोपमम्।
प्रपाकरहितानां च मूत्रं चन्दनसन्निभम्॥
अजीर्णप्रभवे रोगे मूत्रं तण्डुलतोयवत्।
नवज्वरे धूम्रवर्णं बहुमूत्रं प्रजायते॥
मंजिष्ठाभं धूम्रवर्णं च नीलं स्निग्धं मूत्रं वारितुल्यं च शीतम्।

ज्ञात्वा चित्ते बुद्धिमान्मनुष्याणां कुर्यात् तु अन्तर्भेषजं
रोगिणां चे सर्पाकारं भवेद्वातात् छत्राकारं तु पित्ततः।
मुक्ताकारं बलासात्म्यादेतन्मूत्रस्य लक्षणम्॥

Yo. Ra.

Table 5.7: Different shapes of oil and their inference

Different shapes of oil	Inference
Hala (plough), Kurma (tortoise), Sairibhakara (buffalo), Karandamandala (beehive), Shirohina Nara (headless human body), Gatrakhanda (severed body part), Shastra (weapon), Khadga (sword), Mushala Pattisha (kinds of weapons), Shara (arrow), Laguda (stick) and Tripatha (junction of three paths) and Chatushpatha (junction of four paths)	Incurable
Hamsa (swan), Karanda (a type of bird), Tadaga (pond), Kamala (lotus), Gaja (elephant), Chamara (bushy fan made of yalk tail), Chatra (umbrella), Torana (festoon)	Treatment can be intiated
Chalani Sadrisha mutra (oil displaying the figure of a sieve)	Kuladosha (hereditary cause) or Pretadosha (affliction of dead person's soul)
Narakara (human body figure) or Dvimastaka (with two heads)	Bhutadosha (affliction of evil spirits)
Colour of urine like Manjishtha (reddish), Dhumravarna (smoky colour), Nila (blue), Snigdha (unctuous), Varitara (similar to water), Shita (cold)	Can start the treatment
Sarpakara (shape of snake)	Vata dominance
Chatrakara (shape of umbrella)	Pitta dominance
Muktakara (shape of a pearl)	Kapha dominance
Urine resembling the juice of Matulunga, Sauvira (a kind of wine), water or Chandana (sandal)	Urine where in person is having Avipaka
Urine resembling rice water	Urine where is person is suffering from Ajirna
Urine having the colour of smoke and increase in quantity	The person is suffering from Navajvara (fever of recent onset)

Examination of urine: Nowadays, urological investigations play a major role in diagnosis of many of the diseases. In the laboratories, urological investigations are made based on three parts – physical, chemical and microscopical examination of urine.

- ⇨ **Physical examination of urine–** volume, colour, smell, reaction, deposits, specific gravity of urine
  - ❑ **Volume of urine passed in a day ranges from 600– 2,500 ml in 24 hours.** In one frequency of micturition, the urine passed may range from 200 – 250 ml. On an average, the volume of urine passed in 24 hours is around 1,200 to 1,500 ml/ day. In the person suffering from diabetes mellitus or in case of excess drinking of water, volume of urine passed may be increased to > 3,000 ml in 24 hours and in case of severe dehydration, very hot climatic conditions, the person may pass very less amount of urine < 600 ml in 24 hours.
  - ❑ **Colour–** normal colour of urine may range from pale yellow to dark amber colour. Reddish coloured urine is passed in the patient of urinary tract infection or the person who has consumed beetroot. Dark yellowish coloured urine is passed in the patient suffering from hepatobiliary disease or in the people consuming medicines containing vitamin B12.
  - ❑ **Odour–** a strong ammoniacal smell is frequently found in infants and after

decomposition when the urine has been left standing for sometime.

- ☐ **Specific gravity of urine–** is abnormal in the patients suffering from chronic kidney disease, diabetic nephropathy, chronic glomerulonephritis or in conditions associated with overhydration or dehydration etc

⇨ **Chemical examination of urine–** where chemicals either dissolved or suspended in the urine are analysed such as glucose (in the patients of glycosuria such as diabetes mellitus), ketone bodies (in the patients suffering from starvation or uncontrolled diabetes mellitus or severe exercise), proteins (in the patients of chronic kidney disease or diabetic nephropathy), bile salts, bile pigments (in the patients suffering from hepatobiliary dysfunction such as alcoholic liver disease or cholelithiasis), blood (in urinary tract infection or trauma to the urinary tract).

⇨ **Microscopical examination–** is done after obtaining the sediment by the process of centrifugation to observe the epithelial cells, RBCs, WBCs or casts and crystals in the urine sample. This is of much importance in the patients suffering from chronic kidney disease or diabetic nephropathy or in urinary tract infection.

Mala Pariksha

⇨ *Mala Pariksha* refers to the examination of faecal matter.

⇨ Faecal matter should be examined to note the dominance of *Dosha* at the time of examination, presence of *Saamatva* and *Niramatva* and specific characters to diagnose different diseases.

Relation of Dosha dominance and characters of Mala

वातान्मले तु दृढता शुष्कता चापि जायते।
पीतता जायते पित्तात् शुक्लता श्लेष्मतो भवेत्॥
सन्निपाते च सर्वाणि लक्षणानि भवन्ति हि।
त्रुटितं फेनिलं रूक्षं धूमलं वातकोपतः॥
वातश्लेष्मविकारे च जायते कपिशं मलम्।
बद्धं सुत्रुटितं पीतश्यामं पित्तानिलाद्भवेत्॥
पीतश्वेतं श्लेष्मपित्तात् ईषत्सान्द्रं च पिच्छिलम्॥
श्यामं त्रुटितपीताभं बद्धश्वेतं त्रिदोषतः। Yo. Ra.

Table 5.8: Characters of Mala and Inference

Characters of Mala	Inference
Dridhata (hard), Shushkata (dry) and Krishna Varna (blackish discolouration)	Vata dominance
Pitata (yellowish discolouration) and Rakta Varna (reddish discolouration)	Pitta dominance
Shuklata (whitish discolouration)	Kapha dominance
All above said features, blackish, broken, yellowish, solid and whitish	Tridosha dominance
Faeces is broken (loose), frothy and dry and dusky colour	Vata dominance
Brown colour (Kapisha Varna)	Vata Kapha dominance
Fragmented and yellowish black discolouration	Vata Pitta dominance
Semisolid, slimy and yellowish white discolouration	Pitta Kapha dominance

Specific characters of Mala and their inferences

सितं महत् पूतिगन्धं मलं ज्ञेयं जलोदरे।
श्यामं क्षये त्वामवति पीतं सकटीवेदनम्।
अतिकृष्णं चातिशुभ्रमतिपीतं तथाऽऽरुणम्॥
मरणाय मलं किंतु भृशोष्णं मृत्यवे ध्रुवम्।
आमं वा श्लेष्मजं प्राहुर्मिश्रितं द्वन्द्वजं वदेत्।
अपक्वं स्यादजीर्णे तु पक्वं स्वच्छमलं भवेत्॥
अत्यग्नौ पिण्डितं शुष्कं मन्दाग्नौ तु द्रवीकृतम्।
दुर्गन्धं चन्द्रिकायुक्तमसाध्यं मललक्षणम्॥ Yo. Ra.

Examination of faecal matter: Faecal matter consists of voluminous soap gels, residues of intestinal secretions, excretions and innumerable bacterial, many of the bacteria are dead. Normally the only food residues are remnants of muscle fibre and the rough debris of vegetables are observed in the faecal matter. The quantity, odour, colour, consistency and abnormal components should be analysed.

Table 5.9: Characters of Mala and diagnosis of the disease

Stool is white and has a bad stench	The person is suffering from Jalodara (ascites)
Stool appears tawny, and small hard ball like	The condition is due to Kshina Dosha
Stool is black, yellow if associated with Ama and pain in the waist region	The person is suffering from Rajayakshma
Stool is too black, too white, very yellow or red	The person will be going to die
Stool is too black, too white, very yellow or red and if the stool is very hot	Death is certain
Stool is undigested	The person is suffering from Ajirna
Stool is whitish	The person is having Ama inside the body
Shape of stool resembles like a lump and dry	The person is having Atyagni (excess digestive fire)
Stool is having liquid consistency	The person is having Mandagni (weak digestive fire)
Stool having foul smell and shines like moon beam	The person is suffering from Asadhya Vikara (incurable illness)

⇨ **Quantity–** the quantity varies in different individuals and by the type of diet consumed. It is usually about 100 – 200 gms daily one or two motions. It may be considerably increased by undigested food, as in bulky stools in the patients suffering from pancreatic disease; and malabsorption syndromes as well as high residue diet.

⇨ **Odour–** a certain degree of offensiveness is normal due to the presence of indol and skatol, constituents which may be abundant in the patient consuming meat diet. When offensiveness is excessive, then derangement of digestion or absorption can be suspected. Putrifaction of protein is presented with musty smell seen in the patient of pancreatic disease; carbohydrate fermentation produces acids of fermentation.

⇨ **Colour–** discolouration of the stool varies with the type of diet. For example, if the person is only on milk diet, the colour of the stool is canary yellow and the person consuming much meat, there will be dark colouration of faecal matter. When peristalsis is excessive and intestinal contents are hurried downwards, bile gives yellowish green or greenish appearance to the faecal matter. Clay coloured stool is seen in the patient of obstructive jaundice. Hemorrhage in the upper alimentary canal (oesophagus and stomach) gives black tarry appearance to the faecal matter which is termed as malena. Bright red appearance of faecal matter is implying the haemorrhage in the lower alimentary canal. The presence of fat in the faecal matter is indicative of the absence of the bile in the alimentary canal which is termed as steatorrhoea.

⇨ **Consistency–** the normal stool has pultaceous consistency. It should be sufficiently soft for it to be moulded by the intestinal tube, the shape of which it attains. If too soft it may have liquid or semi liquid consistency which is seen in infections of the small or large intestine. If the stool is too hard, it may form rounded masses which is termed as scybala. In extreme cases, scybalous stool mass may be very dry owing to the great absorption of water from them due to the prolonged stay of faecal matter in the large intestine.

⇨ **Abnormal components–** abnormal components may be present in the stool are undigested food particles, blood, pus, mucus or parasites. The presence of undigested food particles may indicate the diagnosis of malabsorption syndromes. The mucus may indicate diagnosis of colitis. Blood in the faecal matter may indicate the bleeding in the lower alimentary canal such as hemorrhoids or carcinoma of the rectum or colon etc. The presence of pus in the faecal matter indicates the infection of the lower alimentary canal. Parasites such as hook worms, round worms or threadworms or tape worms etc can be seen in the faecal matter indicates worm infestation.

Jihva Pariksha

जिह्वा शीता खरस्पर्शा स्फुटिता मारुतेऽधिके।
रक्ता श्यामा भवेत्पित्ते कफे शुभ्रातिपिच्छिला।।
कृष्णा सकण्टका शुष्का सन्निपाताधिके तु सा।
मिश्रिते मिश्रिता ज्ञेया सर्वलक्षणवर्जिता।। Yo. Ra.

Table 5.10: Characters of Jivha and Dosha dominance

Vata dominant Jihva	Shita (cold in touch); Kharasparsha (rough in touch); Sphutita (cracks in tongue)
Pitta dominant Jihva	Rakta (reddish discolouration), Shyama (blackish discolouration)
Kapha dominant Jihva	Shubhra (clear, devoid of coating over the tongue), Atipicchila (excess sliminess)
Sannipata dominant Jihva	Krishna (blackish discolouration), Sakantaka (thorny nature of tongue); Shushka (dry tongue)
Any two Dosha dominant Jihva	Mixed clinical features of tongue

Examination of the tongue: examination of the tongue gives us many clues in the diagnosis of many diseases. Discolouration of the tongue, texture of the tongue, deviation of the tongue, inability to protrude the tongue outside, presence of ulcer in the tongue, presence of coating on the tongue will be helpful in diagnosing many diseases. One should examine the tip, sides of the tongue, dorsal surface and ventral surface of the tongue should be examined.

⇨ **Discolouration of the tongue–** yellowish white discolouration is seen in the patients suffering from anemia, reddish discolouration is seen in the patients of vitamin B12 deficiency, bluish discolouration is seen in the patients suffering from major cardiorespiratory diseases (central cyanosis), yellowish discolouration in the ventral surface of the tongue is implying the disease of hepatobiliary system, white coloured plaques in the tongue and surrounding oral cavity will help in the diagnosis of candidiasis.

⇨ **Texture of the tongue–** on examination of the tongue, it usually have a rough surface due to the presence of taste buds in it. In the person suffering from vitamin B12 or folic acid deficiency, the person will have smooth and bald tongue appearance. In the person with circular red and flattened patches or areas interspersed with zigzag lines implies the person is having geographical tongue. Rough surface of the tongue, also called cauliflower growth of the tongue is indicative of carcinoma of the tongue.

⇨ **Deviation of the tongue–** deviation of the tongue is usually observed in the affected side, i.e. ipsilateral side. This is observed in the patients suffering from the dysfunction of hypoglossal nerve.

⇨ **Inability to protrude the tongue–** inability to protrude the tongue is usually seen in the infants and early childhood. This is attributed to shortened frenulum lingulae. This is termed as tongue tie.

⇨ **Presence of ulcer in the tongue–** this is usually seen in the patients suffering from vitamin B12 deficiency or anemia and in the patient suffering from carcinoma of the tongue.

⇨ **Presence of coating on the tongue–** this is attributable to impaired digestion of the food in the oral cavity. Due to the impaired digestion which is the outcome of the poor salivary secretion, there will be proliferation of the microorganisms in the oral cavity leading to the coating over the tongue.

Shabda Pariksha

गुरुस्वरो भवेत् श्लेष्मा स्फुटवक्ता च पित्तलः।

उभाभ्यां रहितो वातः स्वरतश्चैव लक्षयेत्।। Yo. Ra.

In the context of *Ashtasthana Pariksha*, the term *Shabda Pariksha* refers to the examination of voice of the patient. In case of *Kapha* dominance, there will be *Gurusvara* (heavy voice as if the person is having grief). In case of *Pitta* dominance, the voice of the person will be having clarity in speech. Whereas in case of *Vata* dominance, the person will be having neither *Gurusvara* (heavy voice) nor *Sphutavakta* (clear speech).

Sparsha[1] Pariksha

पित्तरोगी भवेदुष्णो वातरोगी च शीतलः।
श्लेष्मलः स भवेदार्द्रः स्पर्शतश्चैव लक्षयेत्।। Yo. Ra.

The term *Sparsha Pariksha* refers to the nature of touch of the patient by the clinician. Depending upon the *Dosha* dominance in the body, *Sparsha Pariksha* is documented. In case of *Vata* vitiation, there will be *Shita sparsha* (cold in touch). Vitiation of *Pitta* leads to the *Ushna* touch (warm touch) and dominance of abnormal *Kapha* will be presented with Ardra *Sparsha* (wet touch).

Drik Pariksha

The term *Drik Pariksha* refers to the examination of eyes based on the fundamentals of *Ayurveda*. *Yoga Ratnakara* explains the features of eyes based on the *Dosha* dominance observed in the eyes and clinical features observed during the *Arishta Lakshana* in the eyes.

रूक्षा धूम्रा तथा रौद्रा चला चान्तर्ज्वलत्यपि।
दृष्टिर्यदा तदा वातरोगं रोगविदो जगुः।।

दीपद्वेषी च सन्तप्तं पीतं पित्तेन लोचनम्।
जलार्द्रं ज्योतिषा हीनं स्निग्धं मन्दं कफेन तत्।।
द्वन्ददोषे भवेन्मिश्रं तूर्णं तूर्णं विलोचनम्।
श्यामवर्णं च निर्भुग्नं तन्द्रा मोहसमन्वितम्।।
रौद्रं च रक्तवर्णं च भवेच्चक्षुस्त्रिदोषतः। Yo. Ra.

The eye with *Vata* vitiation has the *Rukshatva* (dry eyes); *Dhumra Varna* (smoky discolouration); *Raudra* (ferocious look); *Chala* (unstable eyes or involuntary movements of eyes); *Antarjvalati* (burning sensation inside the eyes) will be present.

The eye with Pitta vitiation has the features of *Dipadveshi* (photophobia); *Santapta* (burning sensation around the eyes); Pita (yellowish discolouration).

The eye with *Kapha* vitiation has the features of *Jalardra* (eye filled with tears); *Jyotisha Hina* (person presented with poor vision or loss of vision); *Snigdha* (unctuousness of eyes); Manda (slow movement of eyes)

The eye with *Dvandva Dosha* vitiation will be presented with quick opening of the eyes, *Shyamavarna* (blackish discolouration), *Nirbhugna* (cracks around the eyes), *Tandra* (drousiness), *Moha* (confusion)

In case of *Tridosha* vitiation, the eyes will be having the features of *Raudra* (ferocious look); *Raktavarna* (reddish discolouration)

Arishta Lakshana related to the eyes

एकं चक्षुर्यदा भीमं द्वितीयं मिलितं भवेत।।
त्रिभिर्दिनैस्तदा रोगी स याति यममन्दिरम्।। Yo. Ra.

If one eye is looking bigger and the other eye is looking smaller, then in such a situation, the person will die in 3 days.

ज्योतिर्विहीनं सहसा रोगिणो यस्य लोचनम्।
ईषत् कृष्णं स नियतं प्रयाति यमशासनम्।।
सरक्तं केष्णवर्णं च रौद्रं च प्रेक्षते यदा।
इति लिंगैर्विजानीयात् मृत्युरेव न संशयः।। Yo. Ra.

If the person is presented with poor or loss of vision, slight blackish discolouration around the eyes, then in such a situation, the person will be going to die in near future.

If the person is presented with reddish or blackish discolouration, *Raudra* (ferocious look) will be going to die in near future.

एकदृष्टिरचैतन्यो भ्रमन् स्फुरिततारकः।
एकरात्रेण नियतं परलोकपथं व्रजेत।। Yo. Ra.

If the person is presented with loss of vision of one eye; associated with involuntary

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GK 1 Refer the dermatological examination for better understanding movements of the eyes and giddiness, then in such a situation, the person is going to die in one day.

शुष्कास्यः श्यामकोष्ठोऽप्यसितरदततिः शीतनासा
प्रदेशः, शोणाक्षश्चैकनेत्रो लुलितकरपदः श्रोत्रपातित्ययुक्तः।
शीतश्वासोऽथ चोष्णश्वसनसमुदयः शीतगात्रप्रकम्पः,
सोद्वेगो निष्प्रपंचः प्रभवति मनुजः सर्वथा मृत्युकाले॥

Yo. Ra.

If the person is presented with *Shushkasya* (dryness of mouth);

Shyamakoshtha (blackish skin eruptions);

Shitanasa (coldness observed around the nose);

Shonaksha (swelling around the eyes); Involuntary movements of the upper and lower limbs; *Shrotrapatita* (deafness);

Shitashvasa Ushnashvasana (sometimes cold breath and sometimes warm breath);

Shitagatrakampa (cold body and involuntary movements of the body),

Udvega (anxiety), then such a person is assumed to be near deathbed.

Examination of the eyes: examination of the eyes plays an important role in diagnosis of many diseases. For the accurate diagnosis, we have to look into the conjunctiva, sclera, sclerocorneal junction, cornea, pupil, extra ocular muscles, medial canthus, accommodation reflex, consensual reflex, nystagmus, exophthalmos, enophthalmos etc should be examined.

- ⇨ The evaluation of **palpebral conjunctiva** will be helpful in the detection of the pallor which is helping in the diagnosis of the anemia
- ⇨ The evaluation of **bulbar conjunctiva** will be helpful in the diagnosis of icterus which will be helpful in the diagnosis of the hepato biliary disease
- ⇨ **Sclero corneal junction–** helpful in the diagnosis of senile arcus, this is observed in the hypercholesterolemia (increased concentration of cholesterol in the blood)
- ⇨ **Cornea–** corneal opacity is present or absent has to be observed. If the corneal opacity is present in front of the pupil, the person will complain of blindness
- ⇨ **Pupil–** examination of the pupil should be done by accommodation reflex, light reflex and consensual reflex. In the person suffering from cataract, the person will be having leukocoria (whitish pupil). In case of pontine hemorrhage (hemorrhage in pons), there will be pin point pupil. When the person is in deathbed, the person will have dilated pupils.
- ⇨ **Extra ocular muscles–** in the person suffering from third cranial palsy, ptosis of the upper eyelid is seen. In the person suffering from sixth cranial palsy, the person will be having divergent squint.
- ⇨ **Medial canthus–** secretion at the level of medial canthus will indicate the obstruction at the nasolacrimal duct or dacryocystitis (inflammation of lachrymal gland). Bitot's spots are oval, triangular or irregular spots suggestive of vitamin A deficiency.
- ⇨ **Nystagmus–** is oscillatory movement of the eyeball either in horizontal or vertical direction. This abnormal movement is seen in lesions of central nervous system or semi-circular canal.
- ⇨ **Exophthalmos–** the presence of bilateral exophthalmos (protrusion of the eyeball) is seen in hyperthyroidism, whereas unilateral exophthalmos is seen in cavernous sinus thrombosis.
- ⇨ **Enophthalmos–** presence of bilateral enophthalmos (sunken eyeball) is seen in severe dehydration and unilateral enophthalmos is seen in absence of the eyeball on that region.
- ⇨ Likewise, we can able to diagnose many diseases just by analysing the status of eyeball and its adnexae.

Akriti Pariksha

As per *Yoga Ratnakara*, the term *Akriti Pariksha* includes the *Lakshana* observed during the assessment of *Prakriti* of an individual. In this assessment, *judgement* of disease status of an individual is made by examination of body features like physical structure, aging features, gait, decubitus, nutritional status and body mass index etc.

Vata Akriti individual

- ⇨ *Sphutita Dhusara Keshagatra*: dust or grey coloured scalp hairs, body parts
- ⇨ *Shita Dvisha* – aversion towards cold climate, cold food substances etc
- ⇨ *Chala Dhriti* – unstable intellect
- ⇨ *Chala Smriti* – unstable memory
- ⇨ *Chala Buddhi* – indecisive nature
- ⇨ *Chala Cheshta* – unstable physical activities
- ⇨ *Chala Sauharda* – instability in person's good heartedness
- ⇨ *Chala Drishti* – instability in person's vision
- ⇨ *Bahu Pralapa* – excess and irrelevant speech

Pitta Akriti individual

- ⇨ *Tikshna Trishna* – uncontrollable thrist or he needs frequent drinking of water
- ⇨ *Tikshna Bubhuksha* – uncontrolled appetite or he needs frequent eating
- ⇨ *Gaura Anga* – white/ yellowish body parts
- ⇨ *Ushna Anga* – warm body parts
- ⇨ *Tamra Hasta Anghri* **and** *Vaktra* – coppery coloured palm, ??, mouth
- ⇨ *Shura Mani* – considers himself as highly courageous
- ⇨ *Pingakesha* – yellowish/ reddish brown scalp hairs
- ⇨ *Alparoma* – less body hairs

Kapha Akriti individual

- ⇨ *Saumya* – cool individual as far as mental status is concerned
- ⇨ *Gudha, Snigdha, Shlishta, Sandhi, Asthi* **and** *Mamsa* – well covered joints, bones with unctuous muscles
- ⇨ *Kshut, Trit, Shoka, Klesha Dharmerataptah* – can able to tolerate hunger, thirst, grief, physical or mental discomfort
- ⇨ *Satvika* – having *Satva* quality in abundance
- ⇨ *Satyasandha* – truthful

Clinical classification of constitution as per western medicine are of 3 categories: they are the simplest, and most useful method of somatotyping is based on clinical observation of the bodily habitus.

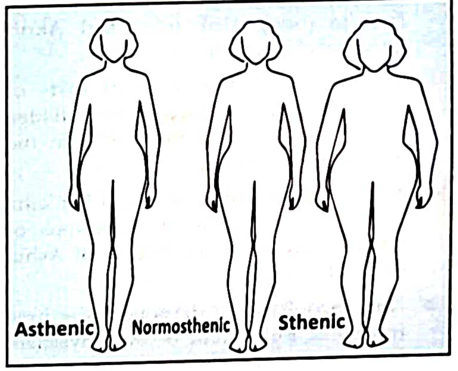


Fig 5.1: Asthenic, normosthenic and sthenic individual

1. **Asthenic (hyposthenic)**, thin, long and underdeveloped body with long neck, flat chest, prominent hypogastrium, slender fingers and with a proclivity to neurasthenia and visceroptosis. This kind of individual will have vertically positioned heart.
2. **Normosthenic (orthosthenic):** with a normal average body build
3. Sthenic (hypersthenic), broad, short and fat with short neck, muscular chest and large and stumpy fingers. This kind of individual will have horizontally positioned heart.

Chapter Resources

1. Yoga Ratnakara, Sharangadhara Samhita
2. Chamberlain's symptoms and signs in clincal medicine by Colin Ogilvie and Christopher C
Evans, 12th Edition, Butterworth Heinmann Publication, Oxford, 1997
3. Physical diagnosis, a textbook of symptoms and physical signs by Rustom Jal Vakil and Aspi
F Golwalla, MPP Private Ltd, Mumbai, 2010
4. Website materials

Key points of the chapter

- ⇨ Ashta Sthana Pariksha is the contribution of Yoga Ratnakara. These are Nadi (pulse), Mutra (urine), Mala (faecal matter), Jihva (tongue), Shabda (voice), Sparsha (skin), Drik (eye) and Akriti (physical characters).
- ⇨ If we analyse all these eight folds of examination, we can have an overall idea of the dominance of the Dosha in the disease manifestation.
- ⇨ Nadi Pariksha and Taila Bindu Pariksha of Mutra are specific contributions of Yoga Ratnakara in the context of Ashta Sthana Pariksha.
- ⇨ Nadi Pariksha should be done by the three fingers of right hand of the physician. Index finger is helpful in identifying Vata Dosha; middle finger for Pitta Dosha and ring finger for Kapha Dosha dominance. Right hand of the male patient and left hand of the female patient is usually taken for the analysis of Nadi. Several other factors such as criteria where Nadi Pariksha is better avoided, the clinical conditions of abnormal Nadi pattern are described elaborately.
- ⇨ As per Yoga Ratnakara, Taila Bindu Pariksha is usually collected before sunrise in a glass vessel and examined after sunrise where minimum movement of air is present. The factors to be examined are spreading nature and sprinking nature of sesamum oil, movement of direction of oil in different directions and various shapes of Tila Taila after adding the oil will decide the prognosis of the disease in diseased individual.

Probable questions may be asked in the examination

Long essays

- ⇨ Briefly discuss Ashta Mahagada and Ashta Vidha Pariksha
- ⇨ Write Ashtavidha Pariksha and also Nadi Parikshan by Prachin and Arwachin method
- ⇨ Explain Ashta Sthana Pariksha as per Yoga Ratnakara
- ⇨ Explain Nadi Pariksha in detail
- ⇨ Explain Mutra Pariksha in detail
- ⇨ Explain Jihva Pariksha in detail
- ⇨ Explain Mala Pariksha in detail

Short essays

- ⇨ Explain Nadi Pariksha
- ⇨ Explain Mutra Pariksha
- ⇨ Describe Mutra Pariksha in different diseases
- ⇨ Explain Taila Bindu Pariksha
- ⇨ Explain Shabda Pariksha as per Yoga Ratnakara
- ⇨ Explain Akriti Pariksha
- ⇨ Explain Jihva Pariksha (tongue examination)
- ⇨ Explain examination of tongue
- ⇨ Write urine examination – Ayurvedic and modern method
- ⇨ Nadi Pariksha Paddhati – traditional and modern
- ⇨ Mala Pariksha
- ⇨ Nadi Pariksha

Short answers

- ⇨ Enumerate Ashta Sthana Pariksha
- ⇨ Explain Sadhyasadhyata of disease based on Taila Bindu Pariksha
- ⇨ Explain Drik Pariksha
- ⇨ Explain Sparsha Pariksha
- ⇨ Explain Shabda Pariksha
- ⇨ Write a short note on Vataja Nadi
- ⇨ Explain Mala Pariksha
- ⇨ Akriti Pariksha
- ⇨ Explain Taila Bindu Pariksha in brief

MCQs

1. **Bahu Pralapa (excess and irrelevant speech) is the feature of .... Akriti individual.**
   a. Vataja;
   b. Pittaja;
   c. Kaphaja;
   d. None of the above
   Answer -(a)
2. **Dhumra Varna (smoky discolouration of eyes) indicates .... Dosha dominance.**
   a. Kapha;
   b. Pitta;
   c. Vata;
   d. All of the above
   Answer -(c)
3. **Bilateral exophthalmos is the condition seen in**
   a. Dehydration;
   b. Cavernous sinus thrombosis;
   c. Hyperthyroidism;
   d. Hypermetropia
   Answer -(c)
4. **Sphuta Vakta (clarity in speech) is the specific Lakshana of .... Dosha dominance.**
   a. Vata;
   b. Pitta;
   c. Kapha;
   d. None of the above
   Answer -(b)
5. **The amount of faecal matter passed by an individual in 24 hours is**
   a. 50 to 100 ml;
   b. 200 to 300 ml;
   c. 100 to 200 ml;
   d. 400 to 500 ml
   Answer -(c)
6. **The amount of urine passed in one frequency of micturition is**
   a. 100 to 150 ml;
   b. 200 to 250 ml;
   c. 400 to 500 ml;
   d. 50 to 100 ml
   Answer -(b)
7. **The Taila (oil) used in Taila Bindu Pariksha is**
   a. Tila Taila;
   b. Sarshapa Taila;
   c. Narikela Taila;
   d. Kusumbha Taila
   Answer -(a)
8. **The nature of Gati in Pitta dominant Nadi is**
   a. Manduka;
   b. Sarpa;
   c. Jalouka;
   d. Rajahamsa
   Answer -(a)
9. **Which of the following nature of Nadi indicates Kapha dominance?**
   a. Rajahamsa;
   b. Mayura;
   c. Kukkuta;
   d. All of the above
   Answer -(d)
10. **The term tachycardia usually refers to**
    a. Increased heart rate;
    b. Increased pulse rate;
    c. Both 1 and 2;
    d. None of the above
    Answer -(c)

***

Dashavidha Parikshya Bhava

6

Learning objectives

- ⇨ The meaning of Dashavidha Parikshya Bhava
- ⇨ The factors coming under Parikshya Bhava
- ⇨ To understand the relevance of Dashavidha Parikshya Bhava

Meaning of Dashavidha Parikshya Bhava

The term '*Dashavidha Parikshya Bhava*' refers to the ten factors to be known by the wise clinician. This will be helpful in determining the appropriate line of management in ailing individuals. These factors are as follow:

1. ***Kaarana* (cause):** In the present context, *Bhishak* (physician) is considered as *Kaarana* for the achievement of main aim of *Ayurveda* i.e. *Dosha Samyata* (equilibrium of *Dosha* in the body)
2. ***Karana* (instruments):** In the present context, *Bheshaja* (medications) are considered as *Karana*.
3. ***Karyayoni* (source of action):** In the present context, disequilibrium of *Dhatu* is considered as *Karyayoni*.
4. ***Karya* (action):** Restoration of disturbed proportions of *Dhatu*
5. ***Karyaphala* (outcome of action):** Attainment of happiness or retaining the healthy status of the body
6. ***Anubandha* (subsequent manifestation or sequel):** *Longivity* or *Dirghayu*
7. *Desha* (habitat): Two types namely, *Bhumi* (place of the individual where he is born and brought up, place where he is diseased, place where he is presently residing) and *Atura* (patient)
8. ***Kala* (season):** *Samvatsara* or the year containing different seasons, and *Aturavastha* (status of the disease in the ailing person)
9. ***Pravritti* (initiation):** Initiation of therapeutic action
10. ***Upaya* (means of action):** Excellence of the physician and correct implementation of treatment protocol

Kaarana

समर्थो भवति; तद्यथा-पर्यवदातश्रुतता, परिदृष्टकर्मता, दाक्ष्यं, शौचं, जितहस्तता, उपकरणवत्ता, सर्वेन्द्रियोपपन्नता, प्रकृतिज्ञता, प्रतिपत्तिज्ञता चेति॥86॥ Ca.Vi. – 8/86

As far as learning of *Roga Nidana* is concerned, the following factors should be known in understanding the concept of *Kaarana*.

- ⇨ ***Paryavadata Shrutata*–** knowledge of medicinal textbooks in their entirety. For example, what are the etilogical factors for the vitiation of *Dosha*, what are the clinical features indicate the vitiation of *Dosha*, the method of planning of *Dosha* vitiation as per the textbook etc
- ⇨ ***Paridrishta Karmata*–** the clinician should have the practical experience in relation to the line of treatment; handling the complications arising out of the improper management of the patient; when to administer the *Vamana* therapy in the patient suffering from *Kaphaja Jvara* etc
- ⇨ ***Dakshya*–** the clinician should have skill in diagnosing the disease, examining the diseased individual, determining the dose and status of the disease etc. for example, the type of *Prakriti* is evident in the patient, the degree of exposure to etiological factor, the involvement of *Dosha* and *Dushya* in the disease manifestation etc

- ⇨ ***Shoucha*–** the clinician should be having purity both internally and externally i.e. physically and mentally.
- ⇨ ***Jitahastata*–** the clinician should be having more success rates in treating the number of different cases
- ⇨ ***Upakaranavatta*–** he should have all the necessary equipments both in terms of *Vyadhi Vinishchaya* and *Chikitsa*. For example, while administering the *Vamana* therapy, all the necessary requirements such as *Yashtimadhu*, *Lavana* and the measures to combat the complications arising out of *Vamana* therapy. In the assessment of *Prakriti*, the clinician should have proper understaning of *Prakriti* and its questionnaire
- ⇨ ***Sarvendriya Upapannata*–** the clinician should have proper sensory faculties, *Gandha*, *Sparsha*, *Rupa* and *Shabda*. For example, *Gudugudayana Shabda* is necessary in the diagnosis of *Atopa*; yellowish discolouration is necessary in the diagnosis of *Kamala* etc
- ⇨ ***Prakritijnata*–** appropriate knowledge of various natural manifestations. For example, the clinician should know the proper movement of *Apanavata* so that its distinction from abnormal movement in *Atisara* or *Udavarta* can be identified
- ⇨ ***Pratipattijnata*–** presence of mind. For example, if the presenting complaint of the patient is altered state of consciousness, then the wise clinician should have the knowledge that what should be the nature of the case history, what type of examination should be preferred, what type of treatment should be carried out to bring back the consciousness of the patient.

Karana

तस्यापीयं परीक्षा-इदमेवंप्रकृत्यैवंगुणमेवंप्रभाव-मस्मिन् देशे जातमस्मिन्नृतावेवं गृहीतमेवं निहितमेव-मुपस्कृतमनया च मात्रया युक्तमस्मिन् व्याधावेवं-विधस्य पुरुषस्यैवतावन्तं दोषमपकर्षत्युपशमयति वा, यदन्यदपि चैवंविधं भेषजं भवेत्तच्चानेन विशेषेण युक्तमिति॥87॥
Ca.Vi. – 8/87

The above factors are the points of assessment of the good quality drug. They are

- ⇨ ***Evam Prakriti*–** nature of the drug. For example, *Bhallataka* is a drug which is considered to be responsible for the formation of the blisters in all parts of the body. That is the reason, very careful handling of the this drug is very much essential.
- ⇨ ***Evam Gunam*–** quality of the drug. The drug *Kadali* is having *Guru* and *Snigdha* quality. If the person is consuming this, there will be sudden vitiation of *Kapha Dosha*.
- ⇨ ***Evam Prabhavam*–** specific action of the drug. The drug *Guduchi* (*Tinospora cardifolia*) is having *Jvaraghna* property. This information will be helpful in case of the person who is diagnosed to be suffering from any of the variety of *Jvara*.
- ⇨ ***Asmin Deshe Jatam*–** place of origin of the drug. For example, the drug which is grown in *Anupa Desha*, usually will have the qualities of *Kapha Dosha*.
- ⇨ ***Asmin Rtau Grihitam*–** season of collection of drug. For example, the drug which is taken in *Grishma Ritu* usually will have maximum qualities in stem itself.
- ⇨ ***Evam Nihitam*–** mode of collection of drug
- ⇨ ***Evam Upaskrita*–** method of processing.
- ⇨ ***Anaya Cha Matraya Yuktam*–** the degree of dose of the medicine administered
- ⇨ ***Asmin Vyadhau*–** the disease in which the medicine is administered
- ⇨ ***Evam Vidhasya Purushasyaiva Tavantam Dosha Apakarshana* or *Upashamana*–**

proper administration of line of treatment for the appropriate *Dosha Shamana* from the body.

Karyayoni

कार्ययोनिर्धातुवैषम्यं, तस्य लक्षणं विकारागमः।
परीक्षा त्वस्य विकारप्रकृतेश्चैवोनातिरिक्तलिङ्गविशेषा-
वेक्षणं विकारस्य च साध्यासाध्यमृदुदारुणलिङ्गविशेषा-
वेक्षणमिति॥8 8॥ Ca.Vi. - -8/88

The term '*Karyayoni*' refers to *Dhatu Vaishamya* i.e. abnormalcy in *Dhatu*. The main feature of *Karyayoni* is manifestation of the disease. The examination of the *Karyayoni* is of two folds: namely, assessment of abnormal functioning of *Dosha* and assessment of *Sadhyasadhyata* and *Mridu Darunatva* of the disease.

The assessment of abnormal functioning of *Dosha* refers to the assessment of increased or decreased function of *Dosha*. For example, if the person is presented with passage of hard stools is suggestive of the increase of *Vata Dosha*. If the person is presented with the passage of mucus mixed stools usually indicates the presence of vitiated *Kapha Dosha*.

The assessment of *Sadhyasadhyata* and *Mridu Darunatva* of the disease refers to the assessment of status of the factors responsible for the manifestation of the disease. For example, 65 years old male is presented with pain in right knee joint associated with joint swelling from a period of 5 years. He is also presented with reduced bowel movements from a period of 2 years. This is suggestive of *Vata* and *Kapha Dosha* involvement with involvement of *Rasa*, *Asthi* involvement and affliction of *Asthivaha* and *Purishavaha Srotas* primarily. This situation is suggestive of *Darunatva* of the disease. The criteria to predict *Darunatva* are age, duration of the illness, involvement of two *Dosha*, two *Dhatu* involvement and involvement of two *Srotas*.

Karya

कार्यं धातुसाम्यं, तस्य लक्षणं विकारोपशमः।
परीक्षा त्वस्य-रुगुपशमनं, स्वरवर्णयोगः, शरीरोपवचयः,
बलवृद्धिः, अभ्यवहार्याभिलाषः, रुचिराहारकाले,
अभ्यवहृतस्य चाहारस्य काले सम्यग्जरणं,
निद्रालाभो यथाकालं, वैकारिणां च स्वप्नानाम् दर्शनं,
सुखेन च प्रतिबोधनं, वातमूत्रपुरीषरेतसां मुक्तिः,
सर्वाकारैर्मनोबुद्धीन्द्रियाणां चाव्यापत्तिरिति॥8 9॥
Ca.Vi. – 8/89

The main outcome observed during *Karya* are restoration of abnormal proportions of *Dosha* or *Dhatu*, in other words, subsidence of the symptoms of *Vikara* (*Roga*).

The *Lakshana* observed during *Karya* are

- ⇨ ***Rug Upashamana***– subsidence of discomfort
- ⇨ ***Svaravarna Yoga***– restoration of normal voice and complexion
- ⇨ ***Sharira Upachaya***– proper nourishment of the body
- ⇨ ***Bala Vriddhi***– increase in strength
- ⇨ ***Abhyavaharya Abhilasha***– desire to consume food
- ⇨ ***Aharakale Ruchi***– appearance of appetite at the time of consumption of food
- ⇨ ***Abhyavahrita Aharasya Kale Samyak Jarana***– proper digestion of ingested food at right time
- ⇨ ***Yathakala Nidralabha***– getting sleep at appropriate time
- ⇨ ***Vaikarikanam Svapnanam Adarshana***– absence of abnormal dreams or dreams indicating morbidity or mortality
- ⇨ ***Sukhena Cha Pratibodhana***– waking up from sleep without much discomfort
- ⇨ ***Vata Mutra Purisha Retasam Muktih***– elimination of flatus, urine, faeces and semen at proper time
- ⇨ ***Sarvakaraih Manobuddhi Indriyanam Avyapattih***– restoration of functions of *Manas* (mind), *Buddhi* (intellect) and *Indriya* (sense organs as well as organs of action)

Karyaphala

कार्यफलं सुखावाप्तिः, तस्य लक्षणंमनोबुद्धीन्द्रिय-
शरीतुष्टिः॥9 0॥
Ca.Vi. – 8/90

Attainment of spiritual happiness is the result of therapeutic action. It is characterised by the pleasure or satisfaction of the mind, intellect, senses and the body.

Anubandha

अनुबन्धस्तु खल्वायुः, तस्य लक्षणं-प्राणैः सह
संयोगः॥9 1॥ Ca.Vi. – 8/91

Anubandha is the synonym of *Ayu*. It is characterised by the union of *Ayu* with *Prana*. As per *Charaka*, *Prana* is of 10 types namely, *Shankha* (right and left temporal region), *Marmatraya* (*Trimarma* – *Basti*, *Shiras* and *Hridaya*), *Kantha* (throat), *Rakta* (blood), *Shukra* (semen), *Ojas* (essence of all seven *Dhatu*), *Guda* (rectum)

Desha

देशस्तु भूमिरातुरश्च॥9 2॥ Ca.Vi. – 8/92

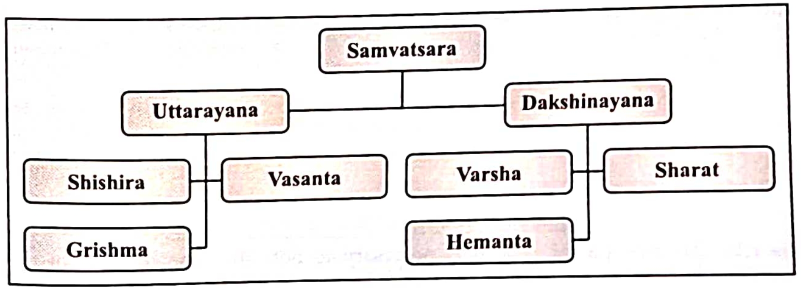
Desha **is of two categories** – *Bhumi* and *Atura Desha*. *Bhumi Desha* refers to the examination of land and *Atura Desha* refers to the examination of diseased individual. The examination of the land is examined in terms of the patient's development as well as the procurement of medcines. In this context, examination in relation to patient's development will be discussed and examination of land based on *Bhumidesha*, is out of the context as far as *Roga Nidana* is concerned. The points discussed in terms of patients and *Desha* are as follow:

- ⇨ The place of birth of the diseased individual
- ⇨ The place of growth of the diseased individual
- ⇨ The place of affliction of the disease with the diseased individual
- ⇨ The type of food consumed by the people living in the surrounding area
- ⇨ The nature of regimen followed by the people living in the surrounding area
- ⇨ The pattern of religious customs followed by the people living in the surrounding area
- ⇨ The average strength of the people living the surrounding area
- ⇨ The nature of mental strength of the people living in the surrounding area
- ⇨ The nature of *Satmya* of the people of the surroundings
- ⇨ The nature of dominance of one or more *Dosha* among the people living in the surroundings
- ⇨ The nature of likings of the people of the surroundings
- ⇨ The nature of the diseases of the people of the surroundings

Kala

कालः पुनः संवत्सरश्चातुरावस्था च। Ca.Vi. – 8/125

Kala Pariksha is basically categorised into *Samvatsara* (year according to *Sanskrit* calender) and *Aturavastha* (stage of the disease in the diseased individual).



Flowchart 6.1: Samvatsara

Table 6.1: Seasons as per Hindu calender and Greek calender

Seasons	Months as per Hindu calendar	Months as per Greek calendar (approx.)
Pravrit	Ashadha	June – July
	Shravana	July – August
Varsha	Bhadrapada	August – September
	Ashvija	September – October
Sharat	Kartika	October – November
	Margashirsha	November – December
Hemanta	Pushya	December – January
	Magha	January – February
Vasanta	Phalguna	February – March
	Chaitra	March – April
Grishma	Vaishakha	April – May
	Jyeshtha	May – June

Pravritti

प्रवृत्तिस्तु प्रतिकर्मसमारम्भः।
तस्य लक्षणं भिषगौषधातुरपरिचारकाणां
क्रियासमायोगः॥1 2 9॥

Ca.Vi. – 8/129

Pravritti means the commencement of treatment of the diseased individual. This is identified by the combined action of *Bhishak* (physician), *Aushadha* (medications), *Paricharaka* (attendant) and *Atura* (patient).

Upaya

उपायः पुनर्भिषगादीनां सौष्ठवमभिविधानं च सम्यक्।
तस्य लक्षणं-भिषगादीनं यथोक्तगुणसंपत्
देशकालप्रमाणसात्म्यक्रियादिभिश्च सिद्धिकारणैः
सम्यगुपपादितस्यौषधस्यावचारणमिति॥1 3 0॥

Ca.Vi. – 8/130

The term *Upaya* refers to the combined form of excellence of *Bhishak, Aushadha, Paricharaka* and *Atura* and administration of appropriate therapy. The *Lakshana* of *Upaya* are

- ⇨ *Bhishak Adinam Yathokta Guna Sampat*- these are the qualities mentioned in *Khuddaka Chatushpada Adhyaya* of *Sutra Sthana* of *Charaka Samhit*
- ⇨ *Aushadha Avacharana* which are properly processed drugs in relation to place of the drug, dose of the drug, time of administration of medicine and homologation

Table 6.2: Qualities of Chikitsa Chatushpada

Bhishak	Shrute Paryavadatatva (textual knowledge)	Drishtakarmata (practical knowledge)	Dakshya (clinical skills)	Shaucha (physical and mental cleanliness)
Aushadha	Bahuta (abundantly available)	Yogyata (suitable to be used)	Anekavidha Kalpana (capable of multiple preparations)	Sampat (highly potent drug)
Paricharaka	Upacharajnata (capable of doing service to the patient)	Dakshya (nursing skills)	Shaucha (physical and mental cleanliness)	Bhartari Anuraga (care towards the patient)
Atura	Smriti (good memory power)	Nirdeshakaritva (obedient towards the orders given by the physician	Abhirutva (fearlessness)	Roganam Jnapakatva (having good knowledge of their suffering)

1.3 Relevance of Dashavidha Parikshya Bhava

⇨ Let us take the example of *Kala*, it is necessary to note the time of onset of the disease, aggravating and relieving factors, associated complaints. For example, if 42 years old individual is incidiously developing non radiating, burning type of pain in the epigastric region, aggravating on consumption of pickles, spicy substances and getting relieved by avoiding pickles and following *Pitta Shamaka* diet; worsening only during *Sharat Ritu*, it implies that the person is having vitiation of *Pitta*. The factors which support vitiation of *Pitta* are age of the individual (30 – 60 years), burning type of pain, aggrevation on consumption of spices and pickles; *Sharat Ritu* being a natural season for the vitiation of *Pitta Dosha*. The ideal line of treatment followed in this occasion could be *Virechana* (purgation) therapy.

⇨ Let us take the **example of Pravritti.** If 46 years old male individual is presented with sudden onset of pain in low back region, radiating to posterior side of the left lower limb which is of pricking type, severe in severity, aggrevating on coughing, sneezing etc and getting relief on taking rest and immobilising the limb, the diagnosis favours the dominance of *Vata Dosha* during the pathogenesis. The physician ideally should plan the treatment to mitigate the vitiated *Vata Dosha*. He should give medicines which will improve the symptoms developed due to vitiated *Vata*. Thus, the term *Pravritti* refers to the adequate utilisation of knowledge of physician, appropriate use of medicine, proper administration of the medicines by the attendant and proper follow up by the patient.

⇨ Let us take the **example of Karya.** If 73 years old individual is presented with pain in the hypogastric region since 2 days, which is non radiating, severe associated with chronic history of constipation. It implies the person is having the vitiation of *Vata Dosha*. The line of treatment should concentrate on pacifying the vitiated *Vata Dosha*.

Chapter Resources

1. Charaka Samhita Vimana Sthana 8th chapter – Rogabhishak Jitiya Adhyaya

Key points of the chapter

⇨ Dashavidha Parikshya Bhavas refers to the ten factors to be known by the wise clinician. This knowledge will be helpful in determining the appropriate line of treatment in diseased individuals.

⇨ The ten factors are

1. Kaarana (cause),
2. Karana (instruments),
3. Karyayoni (source of action),
4. Karya (action), Karyaphala (outcome of the action),
5. Anubandha (subsequent manifestation or sequel),
6. Desha (habitat),
7. Kala (season),
8. Pravritti (initiation) and
9. Upaya (means of action). Each of-the ten factors are elaborated well with current understanding.

Probable questions may be asked in the examination

Long essays

⇨ Explain Dasha Vidha Parikshya Bhava in detail

Short essays

⇨ Dashavidha Parikshya Bhavas

⇨ Describe Dashavidha Parikshya Bhava

Short answers

⇨ Enumerate Dasha Vidha Parikshya Bhava

⇨ Write a short note on Karyayoni

MCQs

1. **Shravana is the season includes which of the following months usually?**
   a. January February;
   b. April May;
   c. July August;
   d. November December
   Answer -(c)
2. **The number of Parikshya Bhava as per Charaka**
   a. 5;
   b. 10;
   c. 7;
   d. 8
   Answer -(b)
3. **Anubandha in the context of Dasha Vidha Parikshya Bhava is**
   a. Upadrava;
   b. Udarka;
   c. Ayu;
   d. Pradhana Vyadhi
   Answer -(c)
4. **Which of the following is categorized under Karyayoni?**
   a. Dosha Vaishamya;
   b. Dhatu Vaishamya;
   c. Dosha Samya;
   d. Dhatu Samya
   Answer -(b)
5. **As per Dasha Vidha Parikshya Bhava, the term Karya refers to**
   a. Dosha Vaishamya;
   b. Dhatu Vaishamya;
   c. Dosha Samya;
   d. Dhatu Samya
   Answer -(d)

***

7

Dashavidha Atura Pariksha

Learning objectives

1. What is meant by Dashavidha Atura Pariksha? Why it should be done?
2. What are the factors included in Dashavidha Atura Pariksha?
3. Detailed explanation of individual type of Dashavidha Atura Pariksha
4. Relevance of Dashavidha Atura Pariksha in Roga Nidana

आतुरस्तु खलु कार्यदेशः।
तस्य परीक्षा आयुषः प्रमाणज्ञानहेतोर्वा स्याद्,
बलदोषप्रमाणज्ञानहेतोर्वा।
तत्र तावदियंबलदोषप्रमाणज्ञानहेतोः; दोषप्रमाणानुरूपो हि
भेषजप्रमाणविकल्पो बलप्रमाणविशेषापेक्षो भवति।
सहसा ह्यतिबलमौषधमपरीक्षकप्रयुक्तमल्पबल-
मातुरमतिपातयेत् ; न ह्यतिबलान्याग्नेयवायवी-
यान्यौषधान्यग्निक्षारशस्त्रकर्माणि वा शक्यन्तेऽल्पबलैः
सोढुम्;असह्यातितीक्ष्णवेगत्वाद्धितानिसद्यःप्राणहराणिस्युः।
एतच्चैव कारणमपेक्षमाणा हीनबलमातु-
रमविषादकैर्मृदुसुकुमार- प्रायैरुत्तरोत्तरगुरुभिरविभ्र-
मैरनात्ययिकैश्चोपचरन्त्यौषधैः; विशेषतश्च नारीः, ता
ह्यनवस्थितमृदुविवृतविक्लवहृदयाः प्राः सुकुमार्योऽबलाः
परसंस्तभ्याश्च। तथा बलवति बलवद्व्याधिपरिगते
स्वल्पबलमौषधमपरीक्षकप्रयुक्तमसाधकमेव भवति।
तस्मादातुरं परीक्षेत प्रकृतितश्च, विकृतितश्च, सारतश्च,
संहननतश्च, प्रमाणतश्च, सात्म्यतश्च, सत्त्वतश्च,
आहारशक्तितश्च, व्यायाम-शक्तितश्च,वयस्तश्चेति,
बलप्रमाणविशेषग्रहणहेतोः॥94॥ Ca.Vi. – 8/94

The term '*Dashavidha Atura Pariksha*' refers to the ten fold of examination of the individual. This is described by *Charaka*. The patient should be examined thoroughly for the assessment of

⇨ ***Aturabala Pramana*** (strength of the diseased individual)

⇨ ***Aturadosha Pramana*** (degree of status of the morbidity of *Dosha*)

⇨ ***Atura Ayu Pramana*** (life span of the individual)

Based on the degree of morbidity of *Dosha*[1] present inside the diseased individual and strength of the individual, the dosage of administration of the medicine can be fixed. If very potent and strong medicines are administered without proper examination of the patient, and the person is physically weak and vitiation of *Dosha* is very low, this may result in death of the individual. The reason is the weak patients are incapable of withstanding the strength of the potent medicines which contain *Agni* and *Vayu Mahabhuta*, *Ksharakarma* (application of *Kshara* or alkali to affected part of the body), *Agnikarma* (cauterisation therapy), *Shastrakarma* (surgical treatment).

If the person is physically or mentally weak,[2] administration of these strong, potent medicines can cause immediate death of the diseased individuals. Therefore, such patients will be given with *Mridu* (mild) *Dravya* with *Avishadakara* effect (not producing any discomfort) and which are not injurious to body and mind.

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[1] By analysing the increase of one *Guna* of *Dosha* for short duration, we can suspect the mild vitiation of *Dosha*. If two Gunas (qualities) of a *Dosha* are increased for longer duration, then we may suspect the moderate vitiation of *Dosha*. If three or more *Gunas* (qualities) of a *Dosha* are increased and the duration of contact with etiological factor is much longer, then we may suspect the severe vitiation of a *Dosha*.

[2] For example, if the suffering individual is elderly, and he is suffering from *Hridroga*, it is a contraindication for the *Vamana* (emesis) therapy. If *Vamana* is given, then that may give more pressure to chest region and thereby worsening the situation of *Hridroga*.

Stronger therapies which are neither distressing during their digestion nor associated with serious complications may be administered slowly and gradually. This should be especially followed in case of women because they are by nature unsteady, light (not deep) and sensitive or weak temperament and also they are mostly tender and subordinate to others.

Weak therapies are administered for a strong individual having severe and serious disease without proper examination, the disease will not get cured.

Thus, for a thorough analysis of the individual in terms of strength of the disease, strength of the person, vitiation of *Dosha*, *Prakriti* of the individual, levels of the *Dhatu*, digestion capacity of the individual etc *Dashavidha Atura Pariksha* is being described in *Charaka Samhita*.

Ten fold examinations are

- ☐ *Prakriti Pariksha* (physical constitution)
- ☐ *Vikriti Pariksha* (morbidity)
- ☐ *Sara Pariksha* (excellence of *Dhatu*)
- ☐ *Samhanana Pariksha* (compactness of organs)
- ☐ *Pramana Pariksha* (measurement of different parts of the body)
- ☐ *Satmya Pariksha* (homologation)
- ☐ *Satva Pariksha* (psychic conditions)
- ☐ *Ahara shakti Pariksha* (power of intake and digestion of food)
- ☐ *Vyayama Shakti Pariksha* (power of performing exercise)
- ☐ *Vaya Pariksha* (age of the individual)

Prakriti Pariksha

Prakriti (constitution) of the foetus is determined by the following factors[3].

1. Quality of the sperm and ovum
2. Nature of season and condition of uterus
3. Food and regimens of the mother
4. Nature of *Mahabhuta* comprising the foetus
   - ☐ The foetus will have the type of *Prakriti* depending upon above mentioned factors when they initially unite during the form of foetus. For example, if the *Shukra* is having *Vata Pradhanya* and *Shonita* is having *Vata Pradhanya*, then usually the resultant foetus will have *Vata Prakriti*. If the *Shukra* is having *Vata* dominance and *Shonita* is having *Kapha Dosha* dominance,[4] the dominance may vary depending upon the dominance of the *Dosha* dominance at the time of conception.
   - ☐ Let us take another example. If the conception of the foetus takes place at the *Sharat Ritu*, this may become a reason for the dominance of *Pitta* as *Sharat* is the natural season for the vitiation of *Pitta Dosha*.
   - ☐ If the pregnant lady is consuming the *Dadhi* (curds) and sweet substances and has the habit of having day time nap, then the progeny will have *Kapha Prakriti*.
   - ☐ If there is *Tejas Mahabhuta* is dominant during the formation of foetus, then probably the coming child may have *Pitta* dominance.

⇨ Above said one or two or three or all four factors may be the determinants of *Prakriti* of the fetus at the time of conception.

Table 7.1: Characters of Kaphaja Prakriti Individual

Unctuous body organs	Snigdha (Unctuous)
Smooth body organs	Shlakshna (smooth)
Pleasing appearance, tenderness and clarity of complexion	Mridu (soft)
Increase in the quantity of semen, libido and increased number of progeny	Madhura (sweet)
Firm, compact and stable body	Saara (firm)
Plumpness and roundness of all organs of the body	Sandra (dense)

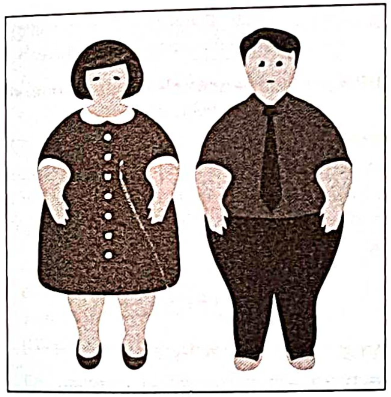

Fig 7.1: Stout individual

Table 7.3: Qualities of Pittaja Prakriti Individual

Intolerance to hot atmosphere and substances, hot face, tender and clear body, the body with multiple freckles, black moles; excessive hunger and thirst; quick development of wrinkles; premature greying of hair; premature baldness of the head; presence of soft and brownish hairs on the face, head and other parts of the body	Ushna (hot)
Sharp demonstration of physical strength, strong digestive power, intake of food and drink in bulk or large quantity; inability to face difficult situations and glutton habits (person who has the capacity of voracious eating)	Tikshna (sharp)
Looseness and softness of the joints and muscles, excess perspiration, passage of urine and faeces in large quantity	Drava (liquid)
Putrid smell of axilla, mouth, head and body in excess	Visra (fleshy smell)
Insufficiency of semen, libido and less progeny	Amla and Katu (sour and pungent taste)

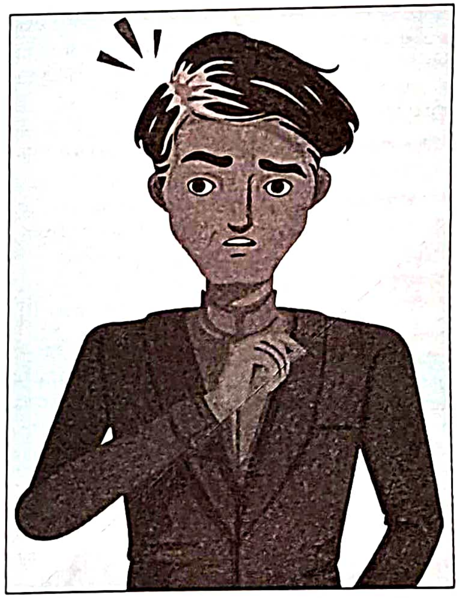

Fig 7.2: Individual having premature greying of hairs, frontal baldness, brownish hairs on the body

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GK [3] *Shukra* and *Shonita* are not the sole factors for the determination of *Prakriti* in the foetus. Below mentioned factors may also play a role in the determination of *Prakriti*.

[4] The common *Guna* (quality) for both *Vata* and *Kapha Dosha* is *Shita Guna* (cold quality). That is the reason, *Shita* quality may be one of the prime reasons for the determination of *Prakriti* (constitution) of the foetus in *Vata Kapha* dominant *Prakriti*. *Laghu Guna* may be one of the prime reasons for the determination of *Vata Pittaja Prakriti*. *Snigdha Guna* may be one of the prime reasons for the determination of *Pitta Kaphaja Prakriti*.

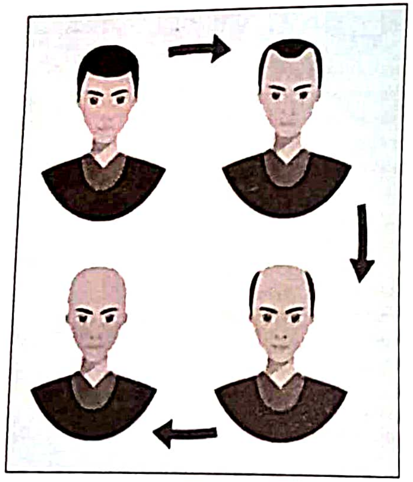

Fig 7.3: Individual having premature greying of hairs, frontal baldness, brownish hairs on the body

Table 7.4: Qualities of Vataja Prakriti Individual

Ununctuousness, emaciation and dwarfness of the body; longdrawn, dry low broken, obstructed and hoarse voice; always keeping awake	Ruksha (Ununctuous or dry)
Light and inconsistent gait, action, food and movement	Laghu (light)
Unstable joints, eyes, eyebrows, jaws, lips, tongue, head, shoulder, hands and legs	Chala (unstable or mobile)
Excessive talkativeness; abundance in tendons and veins	Bahu (abundance)
Quick in initating actions, getting irritated and the onset of morbid manifestation; quick in affliction with fear, quick in likes and dislikes; quick in understanding and forgetting the things	Shighra (swift)
Intolerance for cold things, often getting afflicted with cold, shivering and stiffness	Shita (cold)
Roughness in the hairs of the head, face and other parts of the body, nails, teeth, face, hands and feet	Parusha (rough)
Cracking of the limbs and organs, production of cracking type of sounds in the joints during movement	Vishada (non slime)

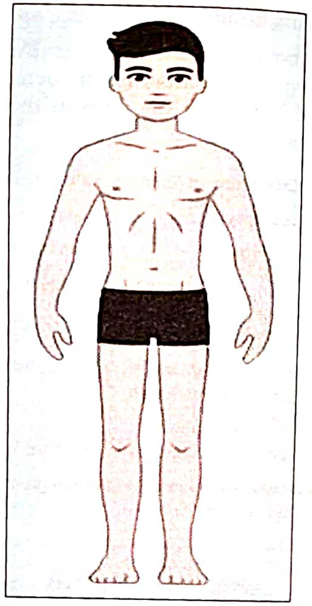

Fig 7.4: Image of the person of lean constitution, visible and varicose veins on the body

In case of *Dvandva Prakriti* (dual *Dosha* dominance) or *Sannipataja Prakriti* (*Sama* i.e. triple *Dosha* dominance), mixed features of dual *Dosha* dominance or triple *Dosha* dominance will be seen.

Vikriti Pariksha

विकृतितश्चेति विकृतिरुच्यते विकारः।
तत्र विकारं हेतु-दोष-दूष्य-प्रकृति-देश-काल-
बलविशेषैर्लिङ्गतश्च परीक्षेत, न ह्यन्तरेण हेत्वादीनां
बलविशेषं व्याधिबलविशेषोपलब्धिः।
यस्य हि व्याधेर्दोष-दूष्य-प्रकृति-देश-काल-बलसाम्यं
भवति, महच्च हेतुलिङ्गबलं, स व्याधिर्बलवान् भवति;
तद्विपर्ययाच्चाल्पबलः; मध्यबलस्तु दोषदू-ष्यादीनामन्यत
मसामान्याद्धेतुलिङ्गमध्यबलत्वाच्चोपलभ्यते॥101॥

Ca.Vi. – 8/101

The typical features of the *Prakriti* (constitution) are lost when the person is afflicted with any of the disease pertaining to localised part or whole body or pertaining to any particular *Srotas* (channel). For example, in the person suffering from *Shlipada* (elephantiasis), then lower limb is involved in the disease process, in the person suffering from *Pandu* (anemia), whole body will be involved in the disease process resulting in either symptoms pertaining to one part or all over the body; pertaining one particular *Srotas* or multiple *Srotas*.

The patient should be examined for *Vikriti* or morbid manifestations. These morbid manifestations are to be examined with reference to the specific

1. *Hetu* (causative factors),
2. *Dosha* (*Dosha* responsible for the disease),
3. *Dushya* (*Dhatu* and *Mala* involved in the disease process),
4. *Prakriti* (constitution of the individual),
5. *Desha* (place of the individual) where the person is born and brought up and getting diseased,
6. *Kala* (season) where in the disease is exacerbated,
7. *Bala* (strength of the individual both physical and mental) and
8. *Linga* (clinical features of the disease).
9. Without determining the strength of the causative factors etc, it is not possible to assess the severity of the symptoms and disease and difficult to predict the prognosis of the disease.

For example[5], if the *Kapha Prakriti* person residing in *Anupa Desha* is having *Kapha Pradhana Vikara* involving the *Rasa*, *Mamsa*, *Medas* shows the aggrevation of the symptoms in *Vasanta Ritu*, the severity of the disease is severe or *Daruna Vikara*. Vigorous treatment for long duration may be required to pacify the severe symptoms as almost all factors are favourable for vitiation of *Kapha Dosha*. If the *Vata Prakriti* individual is residing in *Anupa Desha* and having *Kapha* dominant disease involving *Mamsa* and aggrevation of the symptoms shown in *Sharat Ritu*, then the severity of the disease is considered to be mild in nature. If *Vata Prakriti* individual is suffering from *Pitta* dominant disease involving *Mamsa Dhatu* and all other conditions are not favouring either *Vata* or *Pitta* vitiation, then such an individual is said to be suffering from very mild illness.

Sara Pariksha

तत्र स्निग्धश्लक्ष्णमृदुप्रसन्नसूक्ष्माल्पगम्भीरसुकुमारलोमा-
सप्रभेव च त्वक् त्वक्साराणाम्।
सा सारता सुखसौभाग्यैश्वर्योपभोगबुद्धिविद्यारोग्य-
प्रहर्षणान्यायुष्यत्वं चाचष्टे॥103॥

The patients are to be examined with reference to *Sara* or excellence of the *Dhatu*. The word meaning '*Sara*' refers to the purest forms of *Dhatu* which are of best quality. It is defined as the *Dhatus* based on *Deha Prakriti* (constitution of the individual) depending upon the predominance of a particular *Dhatu* in respect of good quantity as well as good quality. The physical, physio-psychological characteristics of different *Sara* described in the text are reflection of the states of *Dhatusara* in the form of structure and functions. It is defined as tissue vitality, tissue quality as tone of system, constitutional essence, an essence or excellence or purity of *Dhatu* as stamina.

The *Sara* is being mentioned to access the *Bala* (strength) of the person. The term *Bala* is used in two different meanings – physical strength or resistance to the disease and mental strength. The number of *Sara* will directly proportional to the strength of the individual. *Sarvasara* individual is the person having high resistance against disease. A physician should not take any decision by seeing the diseased individual as strong or weak because of leanness of the body. Some people may be lean and have small body, but they are strong. For example, ants will have small body but they can carry heavy load heavier than their body. Some other people may be stout and huge body, but they are weak.

GK 5 In this example, concept of *Vikara Vighata Bhavabhava Prativishesha* or *Vyabhichari Hetu* should be applied.

With a view to determining the specific measure of strength, they are classified into 8 categories depending upon the Sara or excellence of *Dhatu*. These are *Tvak, Rakta, Mamsa, Meda, Asthi, Majja, Sukra* and *Satva*. The *Lakshana* of each *sara* mentioned in the tabular form.

Tvak Sara Lakshana

तत्र स्निग्धश्लक्ष्णमृदुप्रसन्नसूक्ष्माल्पगम्भीर-सुकुमारलोमा सप्रभेव च त्वक् त्वक्साराणाम्।
सासारता सुखसौभाग्यैश्वर्योपभोगबुद्धिविद्यारोग्य-प्रहर्षणान्यायुष्यत्वं चाचष्टे॥103॥ Ca.Vi. – 8/103

The person with *Tvak Sara*[6] have unctuousness, smooth, soft skin and hair, clear, fine, less numerous, deep rooted and tender hair along with lustrous skin. Such people will have happiness, good fortunes, power, enjoyment, intellect, knowledge, health, excitement and longevity.

Raktasara Purusha

कर्णाक्षिमुखजिह्वानासौष्ठपाणिपादतलनखललाटमेहनं स्निग्धरक्तवर्णं श्रीमद्भ्राजिष्णु रक्तसाराणाम्।
सा सारता सुखमुद्धतां मेधां मनस्वित्वं सौकुमार्यमनतिबलमक्लेशसहिष्णुत्वमुष्णासहिष्णुत्वं चाचष्टे॥104॥ Ca.Vi. – 8/104

The person with *Raktasara*[7] will have ears, eyes, face, tongue, nose, lips, sole of the hands and feet, nails, forehead and genital organs that are red in colour, they have beautiful dazzling appearance along with unctuousness. They have unctuous and coppery red coloured nails, eyes, palate, tongue, lips, palms and soles.

Mamsasara Purusha

शङ्खललाटकृकाटिकाक्षिगण्डहनुग्रीवास्कन्धोदर-कक्षवक्षः पाणिपादसन्धयः स्थिरगुरुशुभमांसोपचिता मांससाराणाम्।
सा सारता क्षमां धृतिमलौल्यं वित्तं विद्यां सुखमार्जवमारोग्यं बलमायुश्चदीर्घमाचष्टे॥105॥ Ca.Vi. – 8/105

The person with *Mamsasara*[8] are have stable, heavy, compact, beautiful, handsome appearance and plumpiness in temples, forehead, nape of the neck, eyes, cheeks, jaws, neck, shoulder, abdomen, axillae, chest and joints of upper and lower limbs being covered with flesh. Such people will have well grown body, bones and joints, well developed muscles all over the body.

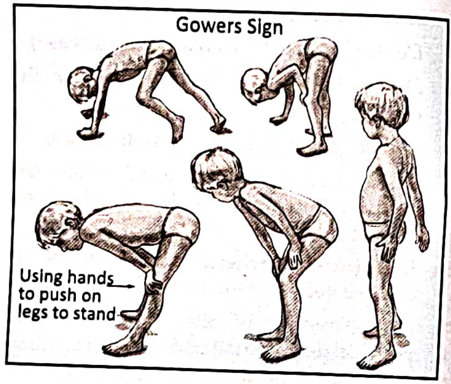

Fig 7.5: Mamsasara Purusha

Medosara Purusha

वर्णस्वरनेत्रकेशलोमनखदन्तौष्ठमूत्रपुरीषेष विशेषतः स्नेहो मेदःसाराणाम्।
सा सारता वित्तैश्वर्यसुखोपभोगप्रदानान्यार्जवं-सुकुमारोपचारतां चाचष्टे॥106॥ Ca.Vi. – 8/106

The person with *Medosara*[9] are characterised by unctuousness in complexion, voice, hair and other parts of the body, nails, teeth, lips, urine and faeces. These people possess wealth, power, happiness, enjoyment, charity, simplicity and delicate habits. They have pleasant voice, but are unable to tolerate exertion.

G K
[6] Pt of severe skin disease
[7] Pt of severe skin infection
[8] Patient of muscular dystrophy
[9] Sumo wrestler image or hyperobese individual

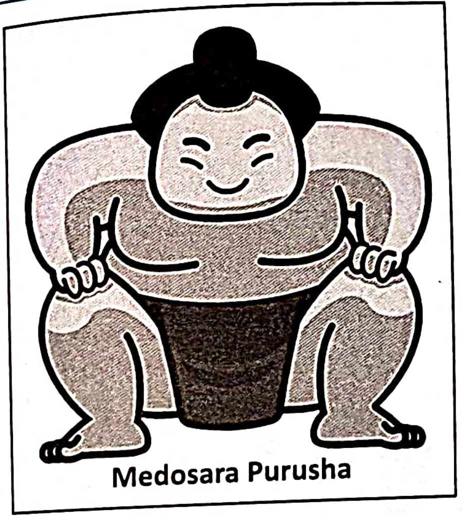

Fig 7.6: Medosara Purusha

Asthisara Purusha

पार्ष्णिगुल्फजात्वरत्निजत्रुचिबुकशिरः पर्वस्थूला स्थूलास्थिनखदन्ताश्चास्थिसाराः।
ते महोत्साहाः क्रियावन्तः क्लेशसहाः सारस्थिरशरीर भवन्त्या-युष्मन्तश्च॥107॥ Ca.Vi. – 8/107

The people who considered to be *Asthisara*[10] *Purusha* are characterised by robust heels, ankles, knees, forearms, collar bones, chin, head, joints, bones, nails and teeth. These people are enthusiastic and active are endowed with strong and firm body with longevity.

Majjasara Purusha

मृद्वङ्गा बलवन्तः स्निग्धवर्णस्वराः स्थूलदीर्घवृत्त-सन्धयश्च मज्जसाराः।
तेदीर्घायुषो बलवन्त श्रुतवित्तविज्ञानापत्यसंमानभाजश्च भवन्ति॥108॥ Ca.Vi. – 8/108

The people with *Majjasara*[11] possess softness of organs, strength, unctuous, complexion and voice. These people will have pleasant and sweet voice, lustrous, longevity, strength, learning, wealth, knowledge, progeny and honour.

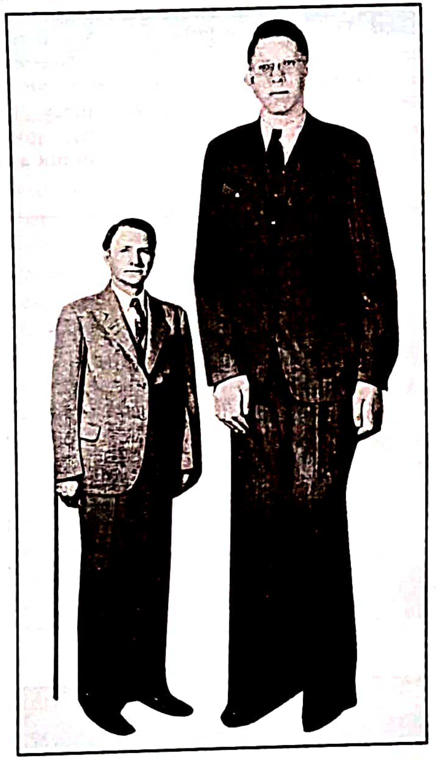

Fig 7.7: Majjasara Purusha

Shukrasara Purusha

सौम्याः सौम्यप्रेक्षिणः क्षीरपूर्णलोचना इव प्रहर्षबहुलाः स्निग्धवृत्तसारसमसंहतशिखरदशनाः प्रसन्नस्निग्धवर्णस्वरा भ्राजिष्णवो महास्फिचश्च शुक्रसाराः।
ते स्त्रीप्रियोपभोगा बलवन्तः सुखै-श्वर्यारोग्यवित्तसंमानापत्यभाजश्च भवन्ति॥109॥ Ca.Vi. – 8/109

Shukrasara[12] *Purusha* possess gentle face and look, as like milk is pouring down from eyes, unctuous, elevated, round, strong, uniform,

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G K
[10] Person of gigantism
[11] Person having hydrocephalus or huge knee joint swelling
[12] Healthy person image – Shukrasara Pravara Purusha

firm with elevated margins, good look, unctuous nails with white colour, bones will be unctuous and firm, large buttocks, lustrous, dazzling, smart and handsome, colour will be clear. These people possess marked penile erection, great power of coitus, excessive sexual desire, clear and unctuous voice, strong mental and physical health, supremacy and prosperity, honour, good progeny, good volume of semen, intelligent and will not any disturbances related to *Shukradushti*.

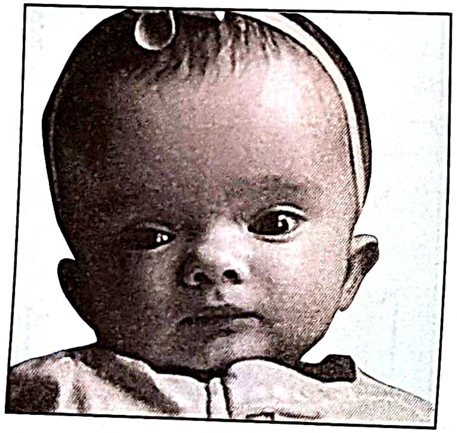

Fig 7.8: Shukrasara Purusha

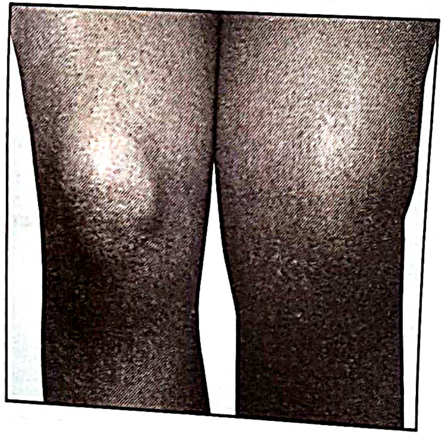

Fig 7.9:

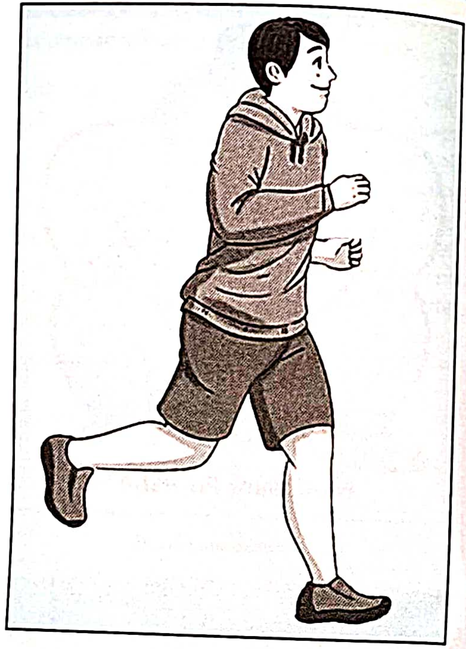

Fig 7.10:

Satvasara Purusha

स्मृतिमन्तो भक्तिमन्तः कृतज्ञाः प्राज्ञाः शुचयो महोत्साहा दा धीराः समरविक्रान्तयोधिनस्त्यक्तविषादाः सुव्यवस्थितगतिगम्भीरबुद्धिचेष्टाः कल्याणाभिनिवेशिनश्च सत्त्वसाराः। तेषां स्वलक्षणैरेव गुणा व्याख्याताः॥110॥

Ca.Vi. – 8/110

The person with *Satvasara*[13] will

Table 7.5: Types of Sara and features of different Sara

Type of Sara	Lakshana
Tvak Sara	Unctous, Slimy, Soft, Prasanna Tvak, minute, few and tender body hairs, lustruous skin
Rakta Sara	Unctuous and red colour of ears, eyes, face, tongue, nose, lips, palms and soles, nails, forehead and genital organs
Mamsasara	Stability, heaviness, good looking appearance, and plumpiness of the temples, forehead, nape, eyes, cheeks, neck, jaws, shoulder, abdomen, axillae, chest and joints of upper and lower limbs being covered with flesh
Meda Sara	Abundance of unctuousness in complexion, voice, eyes, hairs of the head and other parts of the body, nails, teeth, lips, urine and faeces
Asthi Sara	Robust heels, ankles, forearms, collar bones, chin, head, joints, bone, nails and teeth
Majja Sara	Softness of organs, strength, unctuous complexion and voice, robust, long and rounded joints
Shukra Sara	Gentleness, gentle look, having eyes as if filled with milk, cheerfulness, having teeth which are unctuous, round, strong, even and beautiful, clean and unctuous complexion and voice, dazzling appearance and large buttocks
Satva Sara	Good memory, devotion, gratefulness, wisdom, purity, excessive enthusiasm, skill, courage, valour in fighting, absence of sorrow, proper gait, depth of wisdom and sincerity in actions and virtous acts

Individuals possessed with all the above mentioned *Dhatu* including mental faculties are endowed with great strength and happiness, resistance to difficulties, self confidence in all enterprises, virtuous acts, firm and well built body, correct gait, melodious and high pitched voice, happiness, power, wealth, enjoyments, honour, slowness of ageing process, resistance for diseases, large number of children with similar qualities and longevity. The individuals having opposite qualities to the above mentioned qualities then that particular person is said to be *Avara Purusha*.

Samhanana Pariksha

शंहननतश्चेति संहननं, संहतिः, संयोजनमित्येकोऽर्थः।
तत्र समसुविभक्तास्थि, सुबद्धसन्धि, सुनिविष्टामांसशोणितं,
सुसंहतं शरीरमित्युच्यते॥
तत्र सुसंहतशरीराः पुरुषा बलवन्तः, विपर्ययेणाल्पवलाः,
मध्यत्वात् संहननस्य मध्यबला भवन्ति॥116॥

Ca.Vi. – 8/116

A patient is to be examined with reference to his *Samhanana* (compactness of the body). *Samhanana*, *Samhati* and *Samyojana* are the synonymous terms. A compact body is characterised by the symmetrical and well divided bones, well-knit joints and well bound muscles and blood. An individual having a compact body is very strong, otherwise he is weak. When the body is moderately compact, the individual is possessed of moderate strength. This is also assessed by the degree of nourishment of the body. Clinically, patient may be assessed as *Pravara*, *Madhyama* and *Avara Samhanana*. The nutritional status can be assessed by built, distribution, stature, masculine features, sturdy bones, compact joints, adequate blood circulation, physical stamina and endurance.

Pravara Samhanana

- ⇨ Symmetrical and well demarcated bones
- ⇨ Well developed joints
- ⇨ Well bound muscles and blood
- ⇨ Strong built
- ⇨ Good strength

Madhyama Samhanana

- ⇨ Moderate symmetry and moderately demarcated bones
- ⇨ Moderately developed joints
- ⇨ Moderate bound muscles and blood
- ⇨ Moderate built
- ⇨ Moderate strength

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[13] The person with potent mental strength

Avara Samhanana

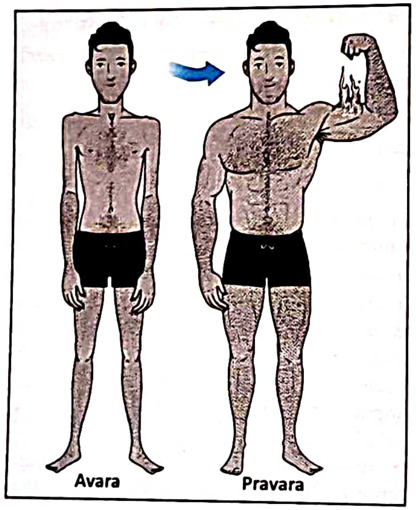

Fig 7.11: Avara Samhanana

- ⇨ Weakly demarcated bones
- ⇨ Weakly developed joints
- ⇨ Weakly bound muscles and blood
- ⇨ Weak or poor built
- ⇨ Weak strength

Pramana Pariksha

प्रमाणतश्चेति शरीरप्रमाणं पुनर्यथास्वेनाङ्गुलिप्रमाणेनोपदेक्ष्यते उत्सेधविस्तारायामैर्यथाक्रमम्॥

Ca.Vi. – 8/117

The patient is also to be examined with reference to *Pramana* or measurement of his bodily organs. This is determined by measuring the height, length and breadth of different organs by taking *Angula* as unit of measurement. *Charaka* described various measurements for different parts of the body. If the measurement is either on the high or low side, the individual possesses qualities contrary to what are mentioned above.

The finger breadth of an individual is considered as one unit of Anguli

Table 7.5: Measurements of different parts of the body as per Charaka Samhita

Part of the body	Height	Length	Breadth	Circumfe-rence	Others (not specified)
Pada (feet)	4	14	6	-	-
Jangha (calf)	-	18	-	16	-
Janu (knee)	-	4	-	16	-
Uru (thigh)	-	18	-	30	-
Vrishana (testicle)	-	6	-	8	-
Shepha (phallus)	-	6	-	5	-
Bhaga (vulva)	-	-	-	12	-
Kati	-	-	-	16	-
Bastishiras	-	-	-	-	10
Abdomen	-	12	10	-	-
Parshva	-	12	10	-	-
Stanantara (distance between two nipples)	-	-	-	-	12
Nipples	-	-	-	2	-
Uras (chest)	12	-	24	-	-
Hridaya (heart region)	-	-	-	-	2
Skandha (shoulder)	-	-	-	-	8
Amsa (shoulder blade)	-	-	-	-	6
Prabahu (arms)	-	-	-	-	16
Prapani (fore arms)	-	-	-	-	15
Hasta (hands)	-	-	-	-	12
Kaksha (axilla)	-	-	-	-	8
Trika (sacrum including coccyx)	12	-	-	-	-
Prishtha (back)	18	-	-	-	-
Shirodhara (neck)	4	-	-	22	-
Anana (face)	12	-	-	24	-
Asya (mouth)	-	-	5	-	-
Chibuka (chin)	-	-	-	-	4
Oshtha (lips)	-	-	-	-	4
Karna (ears)	-	-	-	-	4
Akshimadhya (distance between eyes)	-	-	-	-	4
Nasika (Nose)	-	-	-	-	4
Lalata (forehead)					4
Shira (head)	16	-	-	32	-
Whole body	84	-	84	-	-

Satmya Pariksha

सात्म्यतश्चेति सात्म्यं नाम तद्यत् सातत्येनोपसेव्यमानमुपशेते। तत्र ये घृतक्षीरतैलमांसरससात्म्याः सर्वरससात्म्याश्च ते बलवन्तः क्लेशसहाश्चिरजीविनश्च भवन्ति, रूक्षसात्म्याः पुनरेकरससात्म्याश्च ये ते प्रायेणाल्पबला अल्पक्लेशसहा अल्पायुषोऽल्पसाधनाश्च भवन्ति, व्यामिश्रसात्म्यास्तु ये ते मध्यबलाः सात्म्यनिमित्ततो भवन्ति॥118॥

Ca.Vi. – 8/118

Satmya stands for such factors as are wholesome to the individual even when continuously used. Individuals for whom ghee, milk, oil and meat soup as well as drugs and diets having all the six *Rasa* are wholesome are endowed with strength, the power of the facing difficult situations and longevity. Those who are accustomed to unctuous things and drugs and diets having only one *Rasa* are mostly possessed of less strength, less power (resistance) to face difficult situations, are of smaller life span and of meagre accessories like drugs for treatment for his diseases. If there is combination of both of these types of homologation, individuals are of medium strength.

For example, if a person is having the habit of consumption of only *Amla Rasa* substances, then such individual is considered to be having *Avara Satmya*. This will lead to the vitiation of one *Dosha* or two *Dosha*. In this example, there is a possibility of vitiation of two *Dosha*, *Pitta* and *Kapha*.

- ⇨ **Excess consumption of lemonade** with sufficient quantity of sugar, salt will be responsible for vitiation of *Kapha Dosha* to the maximum extent and *Pitta Dosha* to a lesser extent.
- ⇨ **Excess consumption of bitten rice** with jaggery might be responsible for the vitiation of *Vata Dosha* and *Kapha Dosha*. The degree of *Dosha* vitiation may depend upon the amount of consumption of these substances.
- ⇨ **Consumption of sour curds** added with pepper, salt will be responsible for the vitiation of *Pitta Dosha*.
- ⇨ **Excess consumption of sweets** prepared out of milk and milk products is leading to the vitiation of *Kapha Dosha* to the maximum extent.

Satva Pariksha

सत्त्वतश्चेति सत्त्वमुच्यते मनः।
तच्छरीरस्य तन्त्रकमात्मसंयोगात्।
तक्रिविधं बलभेदेन-प्रवरं, मध्यम, अवरं चेति; अतश्च
प्रवारमध्यावरसत्त्वाःपुरुषा भवन्ति।
तत्र प्रवरसत्त्वाः सत्त्वसारास्ते सारेषूपदिष्टाः, स्वल्पशरीरा
ह्यापि ते निजागन्तुनिमित्तासु महतीष्वपि पीडास्वव्यथा
दृश्यन्ते सत्त्वगुणवैशेष्यात् ; मध्य- सत्त्वास्त्वपरानात्मन्यु-
पनिधाय संस्तम्भयन्त्या-त्मनाऽऽत्मानं परैर्वाऽपि
संस्तभ्यन्ते; हीनसत्त्वास्तु नात्मना नापि परैः सत्त्वबलं
प्रतिशक्यन्ते उपस्तम्भयितुं, महाशरीरा ह्यपि ते स्वल्पानामपि
वेदनानामसहा दृश्यन्ते, सन्निहितभयशोकलोभमोहमाना
रौद्रभैरव-द्विष्टबीभत्सविकृतसंकथास्वपि च पशुपुरुषमांस-
शोणितानि चावेक्ष्य विषादवैवर्ण्यमूर्च्छोन्मादभ्रमप्रप-
तनानामन्यतममाप्नुवन्त्यथवा मरणमिति॥119॥

Ca.Vi. – 8/119

Satva is mind or the assessment of mental faculties and it regulates the body because of its association with the soul. Depending upon its strength, it is of 3 types –

- ☐ *Pravara*,
- ☐ *Madhyama* and
- ☐ *Avara*. *Pravara Satva* individuals are possessed of the excellence of these faculties and the characteristic features of such people are described in the context of *Satva Sara*.
- ⇨ Even if possessed of weak physique, such individuals, because of the specific manifestations of *Satva* qualities in them, tolerate serious exogenous and endogenous diseases.
- ⇨ Individuals of *Madhyama Satva*, tolerate the pain themselves when they realise that other can also tolerate it, at times, they get strength from others.
- ⇨ Individuals of *Avara Satva*, neither by themselves nor through others can sustain their mental strength and even if possessed of plump physique, they cannot tolerate even mild pain. These people are susceptible to fear, grief, greed, delusion, ego, fearful, terrifying situations. They easily fall victims to depression, pallor, fainting, madness, giddiness and sometimes fall on the ground and sometimes these events can call death.

Aharashakti Pariksha

आहारशक्तितश्चेति आहारशक्तिरभ्यवहरणशक्त्या
जरणशक्त्या च परीक्ष्या; बलायुषी ह्याहारायत्ते॥120॥

Ca.Vi. – 8/120

One's capacity for food can be examined from two angles – the power of ingestion and the power of digestion.

Vyayamashakti Pariksha

व्यायामशक्तितश्चेति व्यायामशक्तिरपि कर्मशक्त्या परीक्ष्या।
कर्मशक्तया ह्यनुमीयते बलत्रैविध्यम्॥ Ca.Vi. – 8/121

The patient should be examined with reference to his capacity for exercise[14] which is determined by one's ability to perform work like lifting weight etc. Strength of individuals is classified into three categories depending upon their ability to do work.

Vaya Pariksha

वयस्तश्चेति कालप्रमाणविशेषापेक्षिणी हि शरीरावस्था
वयोऽभिधीयते।
तद्वयो यथास्थूलभेदेन त्रिविधं-बालं, मध्यं, जीर्णमिति।
तत्र बालमपरि Ca.Vi. – 8/122

Age is broadly of 3 stages– *Balyavastha*[15] (0-30 years),

- ☐ *Madhyamavastha* (30-60 years) and
- ☐ *Vriddhavastha* (60-till death).
- ☐ *Balyavastha* is having 2 stages –
- ☐ *Aparipakva Dhatu* (0-16 years) and *Vivardhamana Dhatu* (16-30 years).

During *Aparipakva Dhatu* stage, various organs of the body are not well developed, there is tenderness and the individual cannot tolerate difficulties, there is incomplete strength and the dominance of *Kapha* in the body. In *Vivardhamana Dhatu* stage, different *Dhatu* are in the growing stage. In this stage, the mental faculties are not properly developed.

During *Madhyamavastha*[16], lasting upto 60 years of age, there is well manifested strength, energy, manliness and valour, power of understanding, retention, memorising, speech and analysing facts and the qualities of all *Dhatu*. In this stage, there will be dominance of *Pitta Dosha* in the body.

During *Vriddhavastha* lasting till the death of the individual, there is diminution of all *Dhatu*, strength of sense organs, energy, manliness valour, power of understanding, retention, memorising, speech analysing the facts. There is gradual diminution in the qualities of *Dhatu*. In this stage, there will be dominance of *Vata Dosha* in the body.

Thus, the strength of the individuals can be classified depending on *Pravara*, *Madhyama* and *Avara* stage of above mentioned factors. There by 3 types of medicaments –

- ☐ *Tikshna*,
- ☐ *Madhya* and
- ☐ *Mridu* potency drugs are prescribed as per the findings of *Dashavidha Atura Pariksha*.

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[14] Effect of exercise is explained in detail in the context of causative factors of vitiation of Vata Dosha earlier in the section of *Dosha Prakopaka Karana*.

[15] As far as western physiology is concerned, the developmental phase of female individual is thelarche (development of breast), pubarche (development of pubic hairs) and menarche (onset of menstruation). The average time gap between thelarche and pubarche is about 2 years and average time gap between pubarche and menarche is about 2 years.
In case of development of male individual, the only visible external appearance is appearance of male pattern of pubic hairs.
Images of Tanner classification of male and female body can be added (male – pubic hair development) (female – breast and pubic hair development)

[16] Image of middle aged male and female individual

Tanner's classification of growth

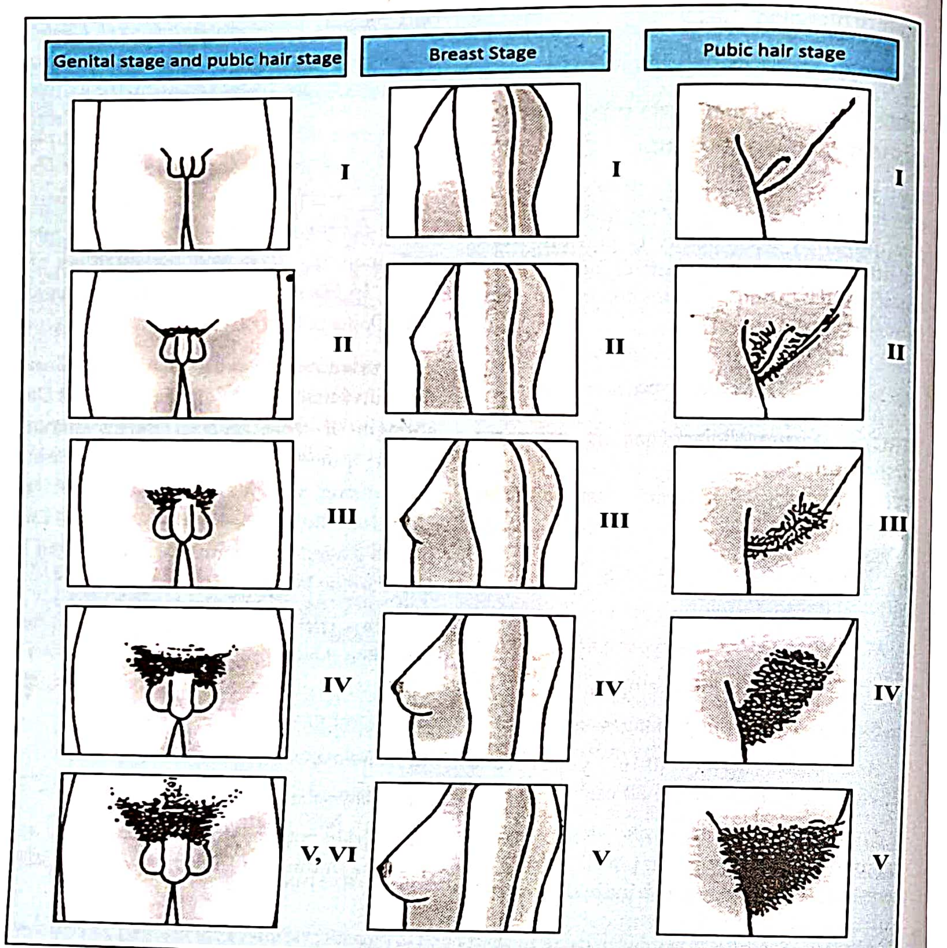

Fig 7.12: Tanner's classification of growth

Relevance of Dashavidha Atura Pariksha in Roga Nidana

- ⇨ As far as the subject of *Roga Nidana* is concerned, *Dashavidha Atura Pariksha* has no role in the diagnosis of the disease. Its role is highly appreciated in deciding the strength of the person and disease and in deciding the prognosis, actual line of treatment, dosage of the medicine to be prescribed to the person, life span of the ailing individual based on the nature of clinical presentation.
- ⇨ Let us take the example of *Prakrititah Pariksha*, if 34 years old individual is showing the dominance of *Pitta Kaphaja* and he is showing the symptoms of headache on exposure to sunlight and at midnight, it implies that the person is having vitiation of *Pitta Dosha*. In other words to say, there is a need of strong medicine to pacify vitiated Pitta in this regard for a longer duration.
- ⇨ Let us take the example of *Vikrititah Pariksha*, if 37 years old male patient of *Pitta Vata Prakriti* from South India who is having an occupation of travelling for long distances in northern part of India and is having the habit of consumption of fried items and food preparation made from mustard oil. This suggests that the person is having more vitiation of *Pitta Dosha* in the body. Age factor, *Prakriti* of the individual, nature of food consumption supports the more severe form of vitiation of *Pitta*.
- ⇨ Let us take the example of *Saara Pariksha*. Let us take the example of two individuals of 30 years where in one person is having *Vata Kapha Prakriti* and another person is having *Pitta Kapha Prakriti* is having the habit of consumption of fried rice together for a period of 6 months regularly. One person is developing skin disease and the other individual is not developing any type of skin disease. This can be attributed to *Pravaratva* (best quality) of *Raktasaara Purusha*.
- ⇨ Let us take the example of *Aharashaktitah Pariksha*. Though *Abhyavaharana* (ingestion) and *Jarana* (digestion) are considered during the assessment of *Aharashakti*, the nature of food article whether *Laghu* or *Guru*; manner of preparation of food whether properly cooked or uncooked; ingredients of food such as coconut oil, mustard oil or preparation of black gram; habit of food consumption such as consumption of warm food or with or without ghee or consumption of food before the digestion of previously ingested meals etc; nature of mental status of the individual during the food intake will decide the digestion of food in an individual.
- ⇨ Let us take the example of *Vyayamashaktitah Pariksha*. During the assessment of *Vyayamashakti*, we have to consider the nature of patient's occupation, degree of nutrition of the patient. For example, if the person is an athlete and he is incapable of running 50 metres and gets breathlessness on exertion then it is considered to be *Avara Vyayamashakti*, as he should have the capability to run for longer distances without much discomfort. If the person is IT professional and he is made to run 50 metres and he gets breathlessness on running, then it should not be considered as *Avara Shakti*, it should be *Madhyama* or *Pravara Shakti*. If the person of 30 years is obese, then he may develop breathlessness, sweating on the forehead, increased heart rate on running 50 metres, it can be considered as *Madhyama* or *Avara Vyayamashakti*.
- ⇨ Let us take the example of *Vayatah Pariksha*. 45 years old male individual is gradually developing non radiating, burning type, mild variety of pain in the epigastric region worsening on consumption of spicy substances and getting relief by taking the diet and medicine which pacify the *Pitta* implies that the degree of vitiation of *Pitta Dosha* is much more severe. In this occasion even the age of the person which lies between 30 to 60 years is another supporting factor in deciding the severity of disease.

Chapter Resources

1. Charaka Samhita Vimana Sthana 8th chapter
2. Relevant informations from Sushruta Samhita, Ashtanga Hridaya and Asthanga Sangraha and other Ayurvedic textbooks
3. Website materials
4. Ganong's physiology
5. Textbook of medical physiology by Arthur C Guyton and John E Hall, 11th edition, Saunders publications, 2006
6. Textbook of pathology by Harsh Mohan, 5th Edition, Jaypee brothers publications, New Delhi, 2005

Key points of the chapter

- ⇨ The main purpose of the Dasha Vidha Atura Pariksha is of three folds –
    - ☐ Atura Bala Pramana (determining the strength of the individual),
    - ☐ Atura Dosha Pramana (determining the degree of Dosha vitiation in the individual) and
    - ☐ Atura Ayu Pramana (determining the life span of the individual).
- ⇨ Dasha Vidha Atura Pariksha in the order of the description are Prakrititah, Vikritah, Saratah, Samhananatah, Pramanatah, Satmyatah, Satvatah, Aharashaktitah, Vyayamashaktitah, Vayatah Pariksha. Each type of Pariksha is described in this chapter with appropriate images to get a better clarity regarding the same.
- ⇨ The role of Dasha Vidha Atura Pariksha in the diagnosis is very negligible, its role is very vital in prediction of prognosis of the disease in the diseased individual and planning appropriate line of treatment.

Probable questions may be asked in the examination

Long essays

- ⇨ Explain Dashavidha Pariksha
- ⇨ Explain Prakriti Pariksha in detail and write its significance in Roga Nidana
- ⇨ Explain Vikriti Pariksha in detail and its significance in Roga Nidana
- ⇨ Explain Saara Pariksha in detail
- ⇨ Describe Dashavidha Pariksha in detail

Short essays

- ⇨ Saara Pariksha
- ⇨ Explain Bala Pariksha Vidhi
- ⇨ Explain Vikriti Pariksha
- ⇨ Write about Pramana Pariksha
- ⇨ Explain Vayatah Pariksha

Short answers

- ⇨ Write the significance of Dashavidha Atura Pariksha
- ⇨ Enumerate Dasha Vidha Atura Pariksha
- ⇨ Saara Pariksha
- ⇨ Satva Pariksha
- ⇨ Saara Pariksha Vidhi
- ⇨ Write Raktasara Purusha Lakshana
- ⇨ Write a short note on Aharashaktitah Pariksha
- ⇨ Satmya Pariksha
- ⇨ Samhanana Pariksha

MCQs

1. **The Dosha dominance in 26 years old individual as per Charaka is**
    a. Vata;
    b. Pitta;
    c. Kapha;
    d. None of the above
    Answer -(c)
2. **Premature greying of the scalp hair is usually in ------------- Prakriti individuals.**
    a. Vata;
    b. Pitta;
    c. Kapha;
    d. None of the above
    Answer -(b)
3. **Types of Sara as per Charaka are**
    a. 7;
    b. 8;
    c. 9;
    d. 6
    Answer -(b)

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4. **The circumference of Bhaga (vulva) as per Charaka is**
    a. 10 Angula;
    b. 12 Angula;
    c. 8 Angula;
    d. 14 Angula
    Answer -(b)
5. **The continuous consumption of Madhura Rasa substances only is an example of**
    a. Pravara Satmya;
    b. Madhyama Satmya;
    c. Avara Satmya;
    d. None of the above
    Answer -(c)
6. **The height of the individual as per Charaka is**
    a. 84 Angula;
    b. 120 Angula;
    c. 90 Angula;
    d. None of the above
    Answer -(a)
7. **The assessment of Aharashakti of an individual is done by**
    a. Jarana Shakti;
    b. Abhyavaharana Shakti;
    c. Both 1 and 2;
    d. None of the above
    Answer -(c)
8. **The person who has the habit of consumption of Mamsarasa daily is an example of**
    a. Pravara Satmya;
    b. Madhyama Satmya;
    c. Avara Satmya;
    d. None of the above
    Answer -(a)
9. **As per Charaka, the term Balyavastha covers the age group of**
    a. 0 to 16 years;
    b. 0 to 20 years;
    c. 0 to 12 years;
    d. 0 to 30 years
    Answer -(d)
10. **The development pattern in female body is**
    a. Thelarche, pubarche, menarche;
    b. Menarche, thelarche, pubarche;
    c. thelarche, menarche, pubarche;
    d. Menarche, pubarche and thelarche
    Answer -(a)

***

ECG, X ray, CT scan, MRI Investigations

8

Learning objectives

- To know the brief idea about the investigations used in the diagnosis of the disease
- To know the fundamentals of these investigations

ECG

- The full form of ECG is Electrocardiogram. ECG will be helpful in diagnosing the heart diseases in about 20% of the cases. 65% of the cardiac diseases can be diagnosed by accurate history and methodical physical examination itself.
- A patient with serious heart disease may show perfectly normal ECG findings and a person who is perfectly healthy, may show bizarre ECG changes in ECG readings. That is why, wise clinician should correlate the clinical findings with that of ECG findings to make the accurate diagnosis.
- Electrocardiograph is the instrument used to record electrocardiogram.
- William Einthoven is the 1st person who recorded electric current from the heart using string galvanometer in the year 1902.
- ECG (EKG) is defined as the graphical representation of electrical potentials generated by the cardiac tissue by the electrodes placed on different parts of the body.
- ECG is a noninvasive, inexpensive and versatile test

Indications of ECG:

- **Chamber enlargement–** RA, RV, LA, LV chamber enlargement
- **Myocardial insufficiency–** ischemia and infarction
- **Electrolyte imbalances –** potassium in particular, hypokalemia, hyperkalemia
- Systemic diseases affecting heart such as thyrotoxicosis, beriberi, hypertensive cardiomyopathy, rheumatic fever
- As a response to therapy such as treatment in myocardial infarction
- Pericarditis
- Effects of certain drugs such as digitalis and other anti arrhythmic agents
- Evaluation of function of pacemakers
  - Origin and behaviour of pacemakers
  - Rhythm disturbances

When ECG is indicated?

- When the person is presented with chest discomfort, breathlessness and pounding heart or palpitations
- Feeling tired or fatigue (weak)
- Unusual heart sounds on auscultation of the chest by the clinician
- A person crosses the age of 40 years
- As a response to certain drugs

ECG paper descriptions:

- It is a special paper with dimensions of small square1mm width and height and large square with 5mm width and height

- Horizontal measurement (X axis) denotes time parameter and Vertical measurement (Y axis) represents voltage parameter.
- The measurement of small square in X axis is 0.04 seconds and vertical measurement of small square is 0.1 mV. The measurement of one large square in X is 0.2 seconds and Y axis is 0.5 mV.

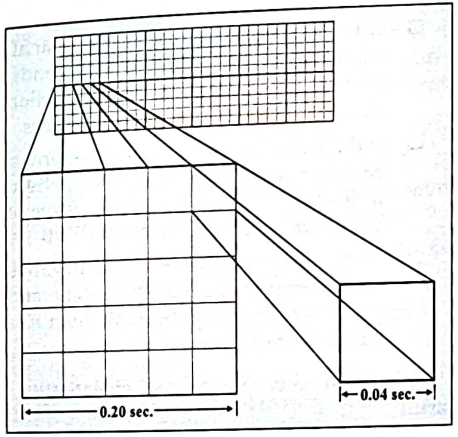

Fig 8.1: ECG graph paper

- The speed of ECG recording is 25 mm/ second.
- **Specialised conduction system of heart:** Specialised conduction system will autogenerate the electrical impulses generate from SA Node situated in the right atrium. Then the electrical impulses travel to atrio ventricular node, next to Bundle of his and left and right bundle branches and finally travel to *Purkinje* fibres.
  - Sino atrial node
  - Atrio ventricular node
  - Bundle of His
  - Left and right bundle branches
  - *Purkinje* fibres

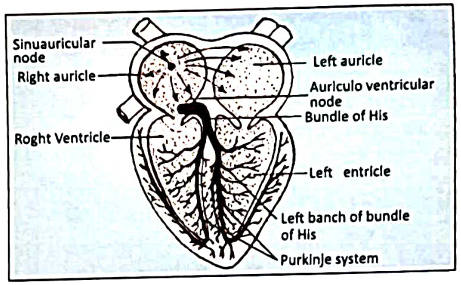

Fig 8.2: Specialised conduction system of the heart

- **Electrical events and wave patterns in ECG:**
  - **P wave–** denotes atrial depolarisation
  - **QRS complex –** represents ventricular depolarisation
  - **Ta wave–** represents atrial repolarisation
  - **T wave–** implies ventricular repolarisation
  - **U wave–** very rarely visible, suggests delayed repolarisation of *Purkinje* fibres
- **Normal components of electrocardiogram (ECG):**
  - **Waves–** P wave, QRS complex, T wave, U wave
  - **Intervals–** PR interval, QRS interval, QT interval, PP interval, RR interval, VAT (ventricular activation time)
  - **Segments –** PR segment, ST segment and TP line

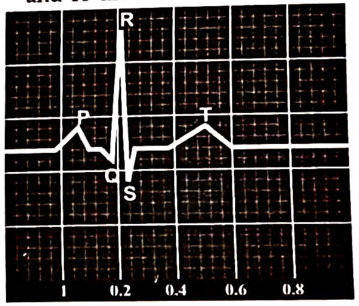

Fig 8.3: ECG wave patterns

☐ **J point** – junction between S wave and ST segment

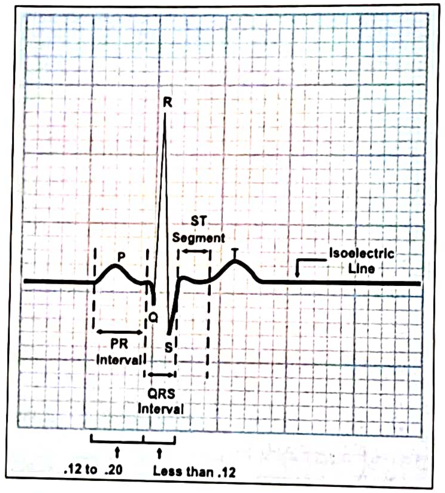

Fig 8.4: ECG different measurements of different readings

P wave: represents atrial depolarisation wave

☐ First wave developed in the cardiac cycle

☐ Smooth wave with measurements less than 2.5 mm in X and Y axes

☐ Has two components – proximal and distal; proximal component denotes right atrial depolarisation and distal component represents left atrial depolarisation

☐ If the width of the P wave is more than 2.5 mm with a notch in the middle of the P wave in X axis is suggestive of left atrial enlargement

☐ If the height of the P wave is more than 2.5 mm and tall and peak P wave in Y axis is suggestive of right atrial enlargement

⇨ **QRS complex:** represents ventricular depolarisation wave

☐ **Q wave:** first negative deflection in the QRS complex

☐ **R wave:** first positive deflection in the QRS complex

☐ **S wave:** first negative deflection following the first positive deflection in the QRS complex

☐ **R′ wave:** second positive deflection in the QRS complex

☐ **S′ wave:** second negative deflection following second positive deflection in the QRS complex

☐ If QRS complex is more than 3 small squares or more than 0.12 seconds, then it is suggestive of conduction disturbances or rhythm disturbances

☐ If the ECG shows rabbit ears pattern or M pattern or RR′ pattern or RsR′ pattern in leads V1, V2 then it is suggestive of right bundle branch block or RBBB

☐ If the ECG shows wide and negative QRS complex in V1 and wide and positive QRS complex in V6 then it is suggestive of LBBB

T wave: represents ventricular repolarisation wave

☐ Has asymmetrical and wide components

☐ Usually in the same direction of QRS complex. For example, QRS complex is upwards, T wave is also in upward direction and vice versa

PR interval:

☐ Time duration between the onset of P wave till the onset of QRS complex

☐ Normal PR interval is 3 – 5 small squares

☐ Normal PR interval is 0.12 to 0.2 seconds

☐ Represents the total time duration for electrical impulse to travel from SAN to AVN

☐ Prolonged PR interval more than 0.20 seconds, then it suggests SA block

QRS interval:

☐ Time duration between the onset of Q wave till the end of the S wave

☐ Normal QRS interval is less than 3 small squares

☐ Normal QRS interval is less than 0.12 seconds

☐ Represents the total time duration for the electrical impulse to travel from Bundle of His to epicardium

☐ If QRS interval is more than 0.12 seconds with features of bundle branch block, then it implies complete bundle branch block

QT interval:

☐ Time duration between the onset of Q wave till the end of the T wave

☐ Normal QT interval is upto 11 small squares

☐ Normal QT interval is upto 0.44 seconds

☐ Represents the total time duration for the total electrical activity in the ventricle

PP interval:

☐ Time duration between the onset of P wave till the onset of next consecutive P wave

☐ Normal PP interval is 15 to 25 small squares

☐ Normal PP interval is 0.6 to 1 second

☐ Represents the atrial rate

☐ Significance of PP interval helps in the diagnosis of complete heart block

RR interval:

☐ Time duration between the peak of one R wave till the peak of next consecutive R wave

☐ Normal RR interval is 15 to 25 small squares

☐ Normal RR interval is 0.6 to 1 second

☐ Represents the ventricular rate

☐ Usually atrial rate is equal to ventricular rate

☐ Significance of RR interval helps in the detection of complete heart block

VAT (ventricular activation time):

☐ Time duration between the onset of Q wave till the peak of the R wave

☐ Normal VAT is less than one small square

☐ Normal VAT is less than 0.04 seconds

☐ Represents the time duration of depolarisation wave to travel from bundle of His to epicardium

Segments:

☐ **PR segment:** line present between the end of the P wave till the beginning of the QRS complex

☐ **ST segment:** line present between the end of the S wave till the beginning of the T wave

☐ **TP line:** line present between the end of the T wave till the beginning of the next P wave

☐ Usually, PR segment, ST segment and TP lines are isoelectric lines. That means there is no upward or downward deflection present between these lines.

J point:

☐ J point is termed as the point present between S wave and ST segment

☐ Helpful in determining ST deviations either elevation or depressions which is helpful in determining the ischemic heart disease and myocardial infarction

12 conventional leads:

These are the 12 leads which are usually used to record the electrical potentials generated by the cardiac tissue. They are

☐ 6 frontal plane leads (limb leads)

- ⇨ **3 bipolar leads** – Lead I, lead II and lead III
- ⇨ **3 unipolar leads** – AVR, AVL and AVF

☐ 6 horizontal plane leads (precordial leads or chest leads)

- ⇨ V1, V2, V3, V4, V5 and V6

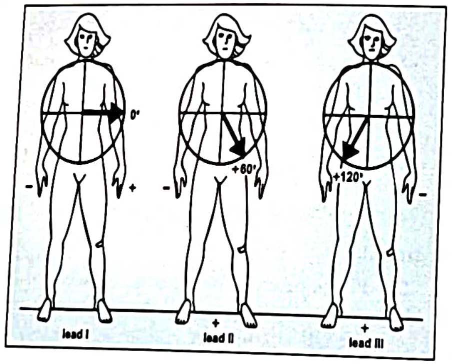

Fig 8.5: ECG conventional leads(a)

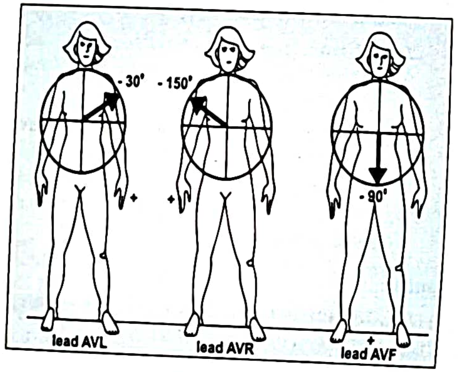

Fig 8.6: Precordial leads(b)

Hexaxial reference system and its application – hexaxial reference system is drawn based on frontal plane leads. This is helpful in the determination of ventricular axis of the given ECG. Before understanding this concept, we have to know the concept of Einthoven triangle and modification of Einthoven triangle into hexaxial reference system.

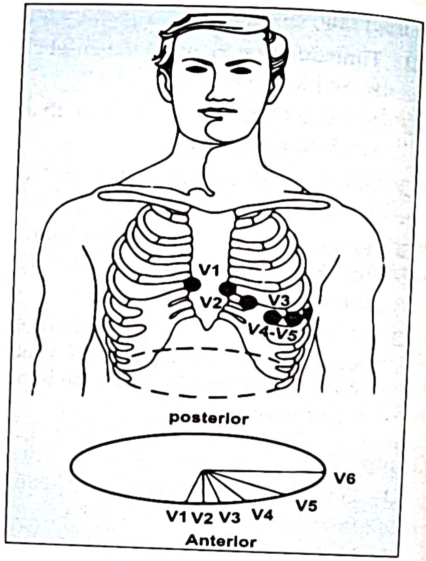

Fig 8.7: 6 Horizontal plane leads

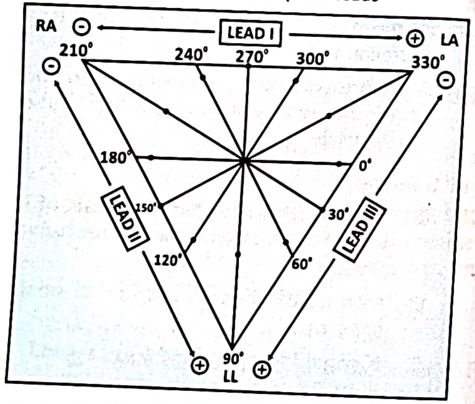

Chart 8.1: Einthoven triangle

⇨ This is the triangle and it is a equilateral triangle.

⇨ The electrical potential generated by an electrode placed in the chest will be producing having higher electrical potential. If the electrode placed at a distance of 5 cm from the centre of the heart will be producing taller electrical potential. If the electrode placed at a distance of 10 cms from the centre of the heart will be producing a less taller electrical potential. If the electrode placed at a distance of > 15 cm from the centre of the heart, changes in the electrical potential is very minimum or negligible. That is the reason, the electrodes placed at left arm (LA), right arm (RA) and left leg (LL) can be considered as three points of equilateral triangle, as these points are present more than 15 cm distance from the centre of the heart. The changes occurring among electrical potentials generated from these points are negligible.

⇨ The bipolar and unipolar leads drawn in the Einthoven triangle are restructured to make hexaxial reference system . Certain important rules of hexaxial reference system are as follow:

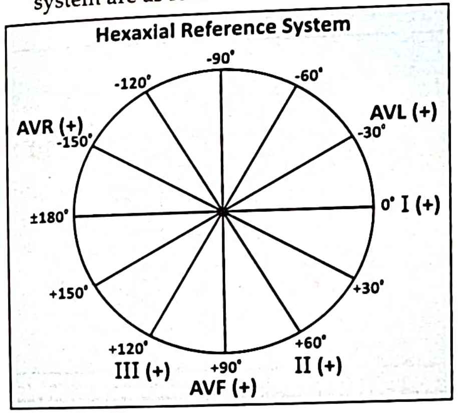

Chart 8.2: Hexaxial Reference System

☐ Frontal plane leads are taken for hexaxial reference system and horizontal plane leads are not considered in analysis.

☐ The positive pole of Lead I is at 0°.

☐ The positive of Lead II is at +60°; Lead III is at +120°; Lead AVF is at +90°; Lead AVL is at – 30° and Lead AVR is – 150°.

☐ Electrical axis present between – 30° to +110° is said to be normal electrical axis.

☐ If the electrical axis present between – 30° and – 90° is said to present in left axis deviation.

☐ If the electrical axis present between +110° and +180° is said to present in right axis deviation.

Methods of identifying ventricular axis of the given ECG strip: there are 4 different rules of identifying the electrical (ventricular) axis.

Rule 1

When there is equiphasic or very small QRS or nil complex is visible in any frontal plane leads, then it suggests that mean QRS is perpendicular to that particular lead. In that situation, we have to look into the leads which are perpendicular the lead showing zero QRS complex. If one observes the positive (upward) deflection, then electrical (ventricular) axis is towards the lead showing positive QRS complex. In the given example, the equiphasic deflection showing nearer to zero potential difference is AVF. That indicates the electrical axis is perpendicular to Lead I. Lead I is having the very tall QRS complex which indicates the electrical axis in this example is 0°.

Learn Rule 1:

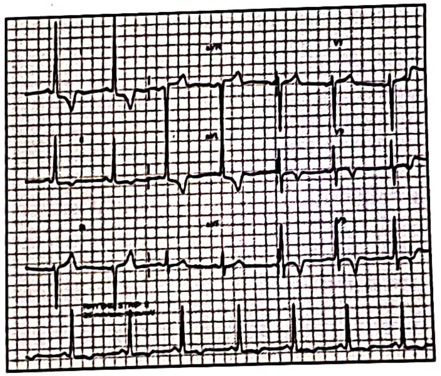

Chart 8.3: Learn Rule 1

Rule 2 :

If 2 adjacent leads have either +ve or –ve deflections of equal size, then it suggests that the mean QRS lies midway between the 2 leads. In all situations, we may not get equal biphasic QRS complexes in any frontal plane leads, in that situation, we have to identify two leads which show exact and similar QRS complexes. This indicates the electrical axis will be passing midway between the two leads. For example, in the given ECG strip, two leads which show equal QRS complexes are Leads II and AVF. The position of Lead II is +60° and Lead AVF is +90°. That means the electrical axis is midway between Lead II and AVF i.e. +75°.

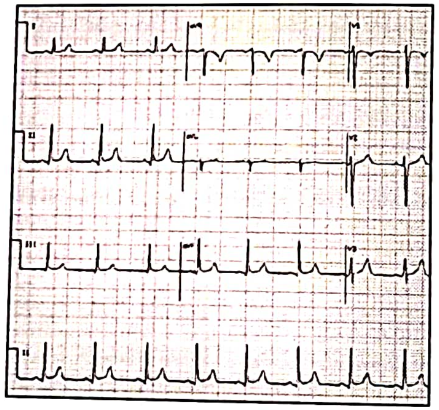

Chart 8.4: learn Rule 2

Rule 3 :

If above two rules are not applicable, then the following rule is used to calculate the electrical axis of the ECG strip. Algebraically calculating the deflections observed in the frontal plane leads, plotting them on the hexaxial reference system. Drawing the perpendicular lines which pass through these points meet at one point. From the centre of the hexaxial reference system, draw the line to the meeting point of the two lines drawn in the reference system. Calculating the angle from + pole of the hexaxial reference system gives the electrical axis of the given strip. In the example, let us take the two leads I and III. The algebraic sum of QRS complex in Lead I is +9 and Lead III is –9. This has to be drawn in the hexaxial reference system. The method of plotting the values of Leads I and III is shown in the following image, which implies the electrical axis of the given ECG strip is – 30°.

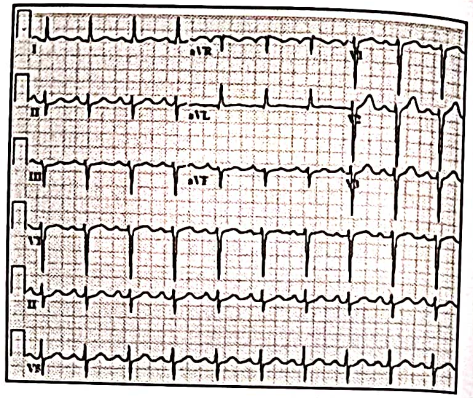

Chart 8.5: learn Rule 3

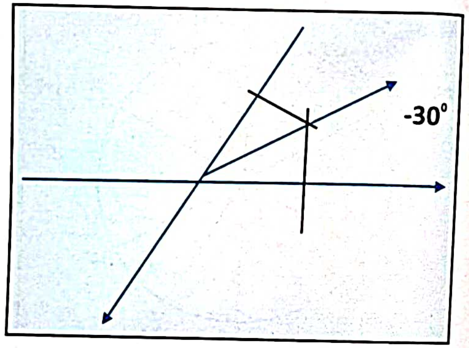

Chart 8.6: Leads I and III showing electrical axis of the given ECG strip is – 30°

Rule 4:

This is the rapid and simple way of identifying electrical axis of the given ECG strip. Remember the mnemonic "Left Leaves and Right Reaches". One has to keep the QRS complex of Lead I above and of Lead III should be kept below. On observing these two images, if QRS of Leads I and III appears to leave each other, then it indicates that there is left axis deviation and if QRS of Leads I and III appears to reach towards each other, then it indicates that there is right axis deviation. The given example of ECG shows that left axis deviation is present in the given ECG strip.

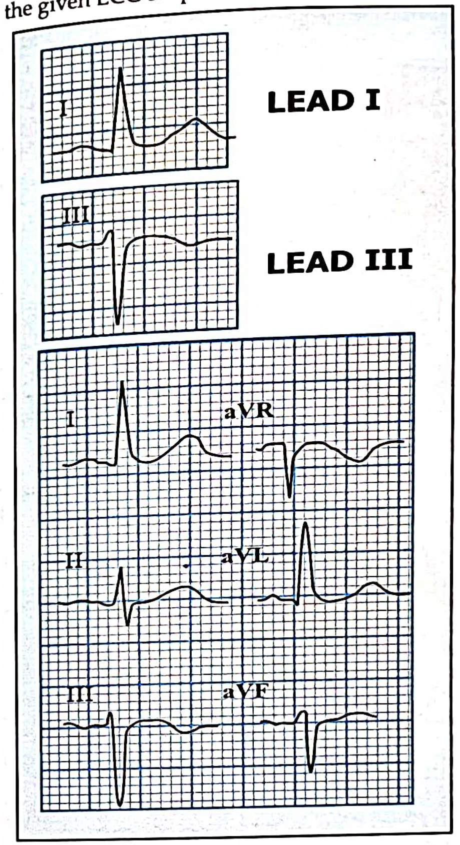

Chart 8.7: To learn Rule 4

Clinical conditions of left axis deviation: If the ventricular axis is more than -30°, then such position of heart is stated to be having left axis deviation

- ⇨ Inferior wall myocardial infarction
- ⇨ Left ventricular hypertrophy
- ⇨ Left bundle branch block
- ⇨ Left anterior hemiblock
- ⇨ Emphysema

Clinical conditions of right axis deviation: If the ventricular axis is more than + 110°, then such position of heart is considered to be right axis deviation

- ⇨ Right ventricular hypertrophy
- ⇨ Right bundle branch block
- ⇨ Antero – lateral myocardial infarction
- ⇨ Left posterior hemiblock

Major cardiac diagnosis points

- ⇨ Chamber enlargement
  - ❑ RAE (Right atrial enlargement)
    - ● **ECG diagnosis** – tall P wave in lead II more than 2.5 mm in Y axis

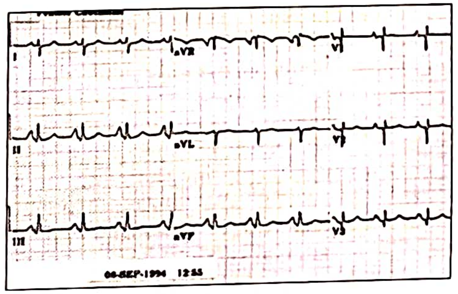

Chart 8.7: Right atrial enlargement (RAE)

  - ❑ **LAE (Left atrial enlargement)**
    - ● **ECG diagnosis** – wide notched P wave in lead II more than 2.5 mm in X axis

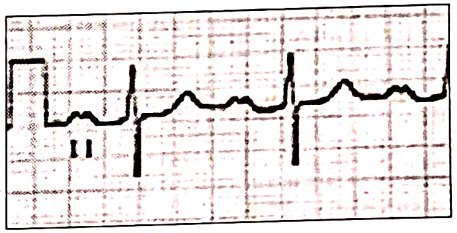

Chart 8.8: Left atrial enlargement (LAE)

  - ❑ RVH (Right ventricular hypertrophy)
    - ● **ECG diagnosis** – R wave > 7 mm in V1
  - ❑ LVH (Left ventricular hypertrophy)
    - ● **ECG diagnosis** – SV1+RV5/RV6 > 35 mm

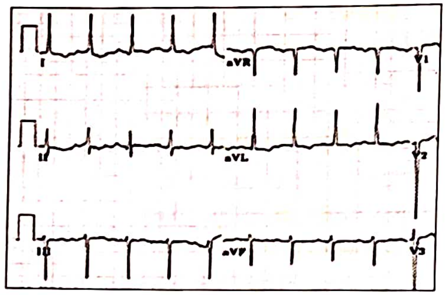

Chart 8.9: Left atrial enlargemnt (LAE)

⇨ Rhythm disturbances

- ☐ Sinus dysrhythmia
  - ● **Sinus arrhythmia** – P wave is present for every QRS complex, and PP or RR interval varies during respiration i.e. during inspiration, there will be short PP or RR interval and during expiration, there will be prolonged PP or RR interval
  - ● **Sinus bradycardia** – P wave is present for every QRS complex and PP or RR interval is prolonged (> 6 large squares in ECG paper

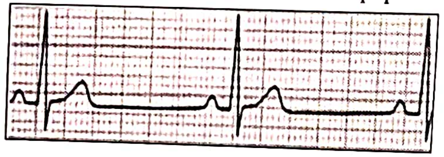

Chart 8.10: Sinus bradycardia

⇨ **Sinus tachycardia** – P wave is present for every QRS complex and PP or RR interval is shortened (< 3 large squares in ECG paper)

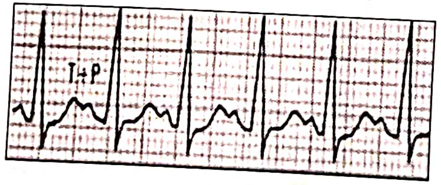

Chart 8.11: Sinus tachycardia

- ☐ Bundle branch blocks
  - ● **Right bundle branch block** – M or rabbit ears pattern in V1

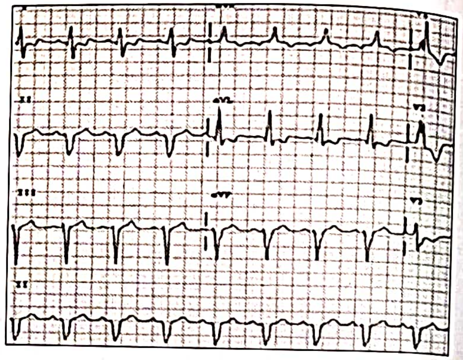

Chart 8.12: Right bundle branch block (RBBB)

⇨ **Left bundle branch block** – prolonged QRS interval downward deflection in V1 and upward deflection in V6

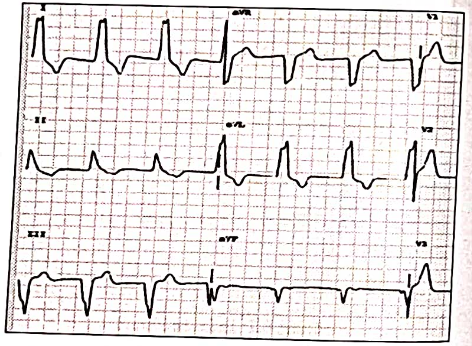

Chart 8.13: Left bundle branch block (LBBB)

☐ **Complete heart block** – PP interval and RR intervals are different which implies slower atrial rate and faster ventricular rate. It implies the electrical impulses generated from sino atrial node (SAN) are not reaching the ventricles.

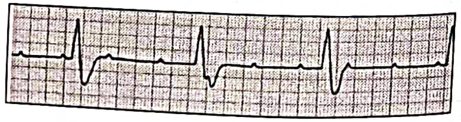

Chart 8.14: Complete heart block

⇨ **Myocardial ischemia** : myocardial ischemia is associated with ST segment and depression and inverted T wave.

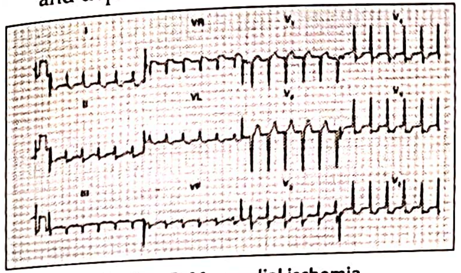

Chart 8.15: Myocardial ischemia

⇨ **Myocardial infarction** : myocardial infarction is associated with presence of q wave, coved ST segment (tombstone ST segment) or curved upwards ST segment and inverted T wave is indicative of myocardial infarction

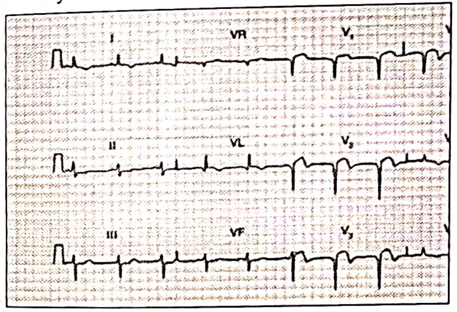

Chart 8.16: Myocardial infarction

Radio imaging

⇨ X rays have been developed for their use in medical imaging. The use of X rays is limited to the detection of the lesions of bone and they are generally unsuitable for detecting the lesions in soft tissues of the body such brain and muscle.

⇨ Notable exceptions are very common. Chest X ray is very much useful. We can identify lung disease (pneumonia, lung cancer, pulmonary oedema, collapse of the lung, cardiomegaly or pleural effusion) and the plain abdominal film, which can detect paralytic ileus (blockage of the intestine), free air (in visceral perforations) and free fluid in ascites.

⇨ In some cases, the use of X rays is questionable, such as gall stones (which are rarely radio opaque) or kidney stones (which are often visible, not always).

⇨ X rays are also used in real time angiography and contrast studies of hollow organs (e.g. barium enema of the small or large intestine), angioplasty, medical interventions of the arterial system, rely heavily on X ray sensitive contrast to identify the potential treatable lesions.

⇨ Radiotherapy, a curative medical intervention now used almost exclusively for cancer, employs somewhat stronger forms of radiation.

⇨ **Principles of X ray:**

- ☐ Physicist Johann Hittoff (1824 – 1914) observed tubes with energy rays extending from negative electrode.
- ☐ These rays produced a fluorescence when they hit the glass walls of the tubes.
- ☐ In 1876, the effect was named 'cathode rays' by Eugene Goldstein. Later, English physicist William Crookes investigated the effects of energy discharges on rare gases, and constructed what is called the Crookes' tube.
- ☐ It is a glass vacuum cylinder, containing electrodes for discharges of a high voltage electric current.
- ☐ He found when he placed unexposed photographic plates near the tube, that some of them were flawed by shadows, though he did not investigate this effect.
- ☐ The principle behind these devices is nowadays called the brems strahlung process, in which a high energy secondary X ray emission is produced when charged particles (such as electrons) pass through matter.

⇨ **Medical applications:**

- ❑ In medicine, the most common use for X rays is in diagnostic imaging. But, there are some applications where the purpose of using the X rays is to affect tissue, such as radiation oncology.
- ❑ In is increasingly common to have images read at a distance from the images equipment, distance ranging from an office to a continent away. A standard method for transmitting these images is digital imaging and communications in medicine (DICOM).

Identification of parts in chest X ray reading:

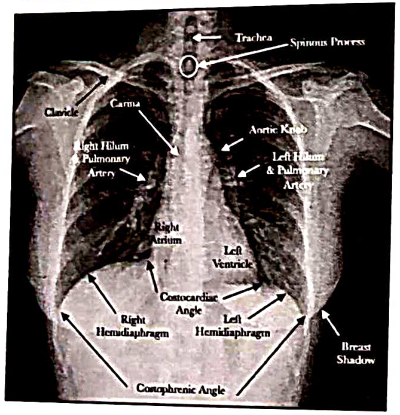

Fig 8.8: Chest X ray reading

Computerised tomography

⇨ Computerised tomography (CT – scan) is a medical imaging method employing tomography. Digital geometry processing is used to generate a three dimensional image of the inside of an object from a large series of two dimensional X ray images taken around a single axis of rotation. The word 'tomography' is derived from the Greek 'tomos' means slice and graphein means to write.

⇨ CT produces a volume of data which can be manipulated through a process known as windowing, in order to demonstrate various structures based on their ability to block the X ray/ Rontgen beam. Although historically the images generated were in the axial or transverse plane (orthogonal) to the long axis of the body, modern scanners allow this volume of data to be reformatted in various planes or volumetric (3D) representation of structures.

⇨ **Principle of CT-scan:**

- ❑ The first production X ray CT machine (in fact called EMI scanner) was limited to making tomographic sections of the brain, but acquired the image data in about 4 minutes (scanning two adjacent slices) and the computation time (using a Data General Nova minicomputer) was about 7 minutes per picture. This scanner required the use of a water filled Perspex tank with a pre-shaped rubber head cap at the front, which enclosed patient's head.
- ❑ The water tank was used to reduce the dynamic range of the radiation reaching the detectors (between scanning outside the head compared with scanning through the bone of the skull).

⇨ Diagnostic use: Since its introduction in 1970s, CT scan has become an important tool in medical imaging to supplement X rays and medical ultrasonography. Although it is still quite expensive, it is the gold standard in the diagnosis of a large number of different disease entities. It has more recently begun to also be used for preventive medicine or screening for disease, e.g. CT colonography for the patients with a high risk of colon cancer. Although a number of institutions offer full-body scans for the general population, this practice remains controversial due to its lack of proven benefit, cost, radiation exposure and the risk of finding incidental abnormalities that may trigger additional investigations.

⇨ **Chest:**

- ❑ CT can be used for detecting both acute and chronic changes in the lung parenchyma, that is the internal structure of the lungs. It is particularly relevant here because normal 2 dimensional X rays do not show such defects. A variety of different techniques are used depending on the suspected abnormality. For evaluation of chronic interstitial processes (emphysema, fibrosis etc), thin sections with high spatial frequency reconstructions are used, often scans are performed both in inspiration and expiration.
- ❑ For detection of air space disease (such as pneumonia) or cancer, relatively thick sections are taken.
- ❑ IV contrast may also be used as it clarifies the anatomy and boundaries of the great vessels and improves the assessment of the mediastinum and hilar regions for lymphadenopathy, this is particularly important for accurate assessment of cancer.
- ❑ CT angiography of the chest is also becoming the primary method for detecting pulmonary embolism (PE) and aortic dissection, and requires accurately timed rapid injections of contrast (bolus tracking) and high-speed helical scanners. CT is the standard method of evaluating abnormalities.

⇨ **Abdominal and pelvic:**

- ❑ CT is a sensitive method for diagnosis of abdominal diseases. It is used frequently to determine stage of cancer and to follow progress. It is also a useful test to investigate acute abdominal pain (especially in lower quadrants, whereas ultrasound is the preferred first line investigation for right upper quadrant pain).
- ❑ Renal stones, appendicitis, pancreatitis, diverticulitis, abdominal aortic aneurysm and bowel obstructions are the conditions that are readily diagnosed and assessed with CT scan.
- ❑ CT scan is also the first line for detecting solid organ injury after trauma
- ❑ CT scan has limited application in the evaluation of the pelvis. For the female pelvis in particular, ultrasound and MRI are the imaging modalities of choice. Nevertheless, it may be part of abdominal scanning (e.g. for tumours), and has uses in assessing fractures.
- ❑ CT scan is also used in osteoporosis studies and research alongside dual energy X ray absorptiometry.

⇨ **Extremities:**

- ❑ CT scan is often used to image complex fractures, especially ones around joints, because of its ability to reconstruct the area of interest in multiple planes. Fractures, ligamental injuries and dilsocations can easily be recognised with a 0.2 mm resolution.

In *Ayurveda* practice, we will come across patients with cerebro vascular accident, either cerebral infarction (death of certain cerebral tissue) and intracranial hemorrhage and lacunar infarcts. Lacunar infarcts are having the lesion in the brain varying from 2 to 15 mm in diameter. Confirmation of lacunar infarcts is little bit difficult on CT scan head.

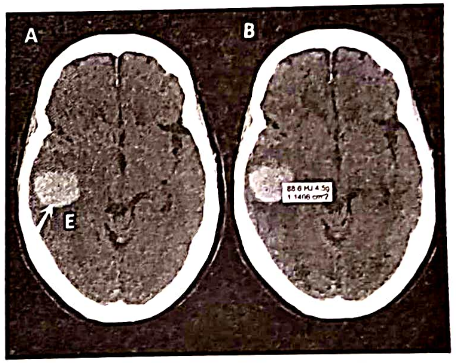

Fig 8.9: CT head haemorrhage

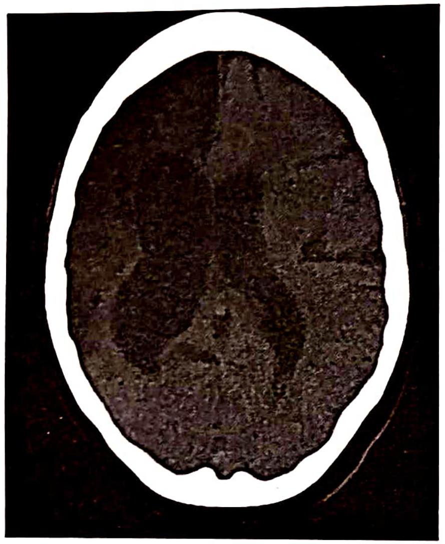

Fig 8.10: CT head infarction

Ultrasonography

- Diagnostic sonography (ultrasonography) is an ultrasound based diagnostic imaging technique used for visualising internal body structures including tendons, muscles, joints, vessels and internal organs for possible pathology or lesions. The practice of examining pregnant women using ultrasound is called obstetric sonography and is widely used.
- In physics, ultrasound refers to sound waves with a frequency too high for humans to hear. Ultrasound images (sonograms) are made by sending a pulse of ultrasound into tissue using an ultrasound transducer (probe). The sound reflects and echoes off parts of the tissue; this echo is recorded and displayed as an image to the operator.
- In ultrasonography, a signal generator is combined with a transducer. Piezoelectric crystals in the signal generator convert electricity into high frequency sound waves, which are sent into tissues. The tissues scatter, reflect and absorb the sound waves to various degrees. The sound waves that are reflected back (echoes) are converted into electric signals. A computer analyses the signals and displays the information on a screen. Ultrasongraphy is portable, widely available, and safe. No radiation is used.
- **Variations:** Ultrasound information can be displayed in several ways.
  - **A-mode:** this display mode is the simplest; signals are recorded as spikes on a graph. The vertical (Y) axis of the display shows the echo amplitude and the horizontal (X) axis shows depthe or distance into the patient. This type of ultrasonography is used for ophthalmologic scanning.
  - **B-mode (Gray scale):** This mode is most often used in diagnostic imaging; signals are displayed as a 2-dimensional anatomic image. B-mode is commonly used to evaluate the developing fetus and to evaluate organs, including the liver, spleen, kidneys, thyroid gland, testes, breasts and prostate gland. B-mode ultrasonography is fast enough to show real time motion, such as the motion of the beating heart or pulsating blood vessels. Real time imaging provides anatomic and functional information.
  - **M-mode:** This mode is used to image moving structures; signals reflected by the moving structures are converted into waves that are displayed continuously across a vertical axis. M-mode is used primarily for the assessment of fetal heart beat and in cardiac imaging, most notably to evaluate valvular disorders.
  - **Doppler:** This type of ultrasonography is used to assess blood flow. Doppler ultrasonography uses the Doppler effect (alteration of sound frequency by reflection of a moving object). The moving objects are RBCs in blood.
    - Direction and velocity of blood flow can be determined by analysing changes in the frequency of sound waves.
- If a reflected sound wave is lower in frequency than the transmitted sound wave, blood flow is away from the transducer.
- If a reflected sound wave is higher in frequency than the transmitted sound wave, blood flow is toward the transducer.
- The magnitude of the change in frequency is proportional to blood flow velocity.
- Changes in frequency of the reflected sound waves are converted into images showing blood flow direction and velocity.
  - **Duplex Doppler ultrasonography** combines the graphic display of special ultrasonography with the images of B-mode. For colour Doppler ultrasonography, colour is superimposed on a gray scale anatomic image. The colour indicates direction of blood flow. By convention, red indicates flow toward and blue indicates flow away from transducer.
  - **Doppler ultrasonography** is also used to evaluate vascularity of tumours and organs, to evaluate heart function (e.g. as for echocardiography), to detect occlusion and stenosis of blood vessels and to detect blood clots in blood vessels (e.g. in deep vein thrombosis).
- **Disadvantages:**
  - Quality of images depends on the skills of the operator. Obtaining clear images of the target structures can be technically difficult in overweight patients.
  - Ultrasonography cannot be used to image through bone or gas, so certain images may be difficult to obtain.
- **Conclusion:** Typical diagnostic sonographic scanners operate in the frequency range of 2 to 18 megahertz, though frequencies upto 50-100 megahertz have been used experimentally in a technique known as biomicroscopy in special regions, such as the anteriorchamber of the eye. The choice of frequency is a trade-off between spatial resolution of the image and imaging depth; lower frequencies produce less resolution but image deeper into the body. High frequency sound waves have a smaller wavelength and thus are capable of reflecting or scattering from smaller structures. Higher frequency sound waves also have a larger attenuation coefficient and thus are more readily absorbed in tissue, limiting the depth of penetration of the sound wave into the body.
  - Sonography is widely used in medicine. It is possible to perform both diagnosis and therapeutic procedures, using ultrasound to guide interventional procedures (for instance biopsies or drainage of fluid collections). Sonographers are medical professionals who perform scans which are then typically interpreted by radiologists, physicians who specialise in the application and interpretation of a wide variety of medical imaging modalities, or by cardiologists in the case of cardiac ultrasonography (echocardiography).
  - Sonographers typically use a right hand-held probe (transducer) that is placed directly on and moved over the patient. Increasingly, clinicians (physicians and other health care professionals who provide direct patient care) are using ultrasound in their office and hospital practices, for efficient, low cost, dynamic diagnostic imaging that facilitates treatment planning while avoiding any ionising radiation exposure.
  - Sonography is effective for imaging soft tissues of the body. Superficial structures such as muscles, tendons,

testes, breast, thyroid and parathyroid glands, and the neonatal brain are imaged at a higher frequency (7-18 MHz), which provides axial and lateral resolution. Deeper structures such as liver and kidney are imaged at a lower frequency of 1-6 MHz with lower axial and lateral resolution but a greater penetration.

Magnetic Resonance Imaging

- Magnetic Resonance Imaging (MRI), nuclear magnetic resonance imaging (NMRI), or magnetic resonance tomography (MRT) is a medical imaging technique used in radiology to visualise internal structures of the body in detail.
- MRI makes use of the property of nuclear magnetic resonance (NMR) to image nuclei of atoms inside the body. MRI can create more detailed images of the human body than are possible with X rays. An MRI scanner is a device in which the patient lies within a large, powerful magnet where the magnetic field is used to align the magnetisation of some atomic nuclei in the body, and radio frequency magnetic fields are applied to systematically alter the alignment of this magnetisation. This causes the nuclei to produce a rotating magnetic field detectable by the scanner and this information is recorded to construct an image of the scanned area of the body.
- Human body is a chemical composition of several elements such as hydrogen, carbon, nitrogen, sodium, phosphorus, potassium etc in various chemical combinations. It has been observed that the atoms of some of these elements have odd number of protons in their nuclei thus, possess magnetic properties. The magnetic properties of these elements have been utilised to produce magnetic resonance signals and images. The most abundant of these present in human body are the protons of the hydrogen atom in the form of water and various other organic compounds such as fats, fluids and cholesterol etc.
- When the patient is placed in the strong magnetic field in the MRI scanner, the hydrogen nucleus in the body align with the applied external magnetic field when exposed to short burst of electromagnetic energy in the form of radiofrequency (RF) pulses. The hydrogen nuclei in the patient's body absorb its energy and then generate MR signal. This process of absorbing energy is known as 'magnetic resonance'.
- Hydrogen nuclei (with single proton) in the absence of external interference, are in random motion and their magnetic moment cancel each other resulting in overall 'null or zero magnetisation. As per the law of quantum mechanics, in the presence of an external magnetic field, the spinning nuclei may align themselves in two directions either parallel or antiparallel to the external magnetic field applied. Therefore, when the patient is placed inside the magnetic field, the hydrogen nuclei (protons) in the body get aligned in proper orientation and this leads to the patient being magnetised which in turn emits signals which are captured by the receiver and after a series of processing, transformation results in the formation of images on the screen.
- MRI provides good contrast between the different soft tissues of the body, which makes it especially useful in imaging the brain, muscles, heart and cancers compared with other medical imaging techniques such as computed tomography (CT-scan) or X rays. Unlike CT scans or traditional X-rays, MRI does not used ionising radiation.
- In Ayurveda practice, MRI scan investigations are of very much clinical significance in the diagnosis of sciatica syndrome. As mm of displacement posteriorly is very painful. Source of image is www.cortho.org.

Contrast agents and implants

- In MRI contrast agents may be injected intravenously to enhance the appearance of blood vessels, tumours or inflammation, may also be directly injected into a joint in the case of arthrograms.
- Unlike CT, MRI uses no ionising radiation and is generally a very safe procedure. Nonetheless, the strong magnetic fields and radio pulses can affect metal implants, including cochlear implants and cardiac pacemakers. There are many electronically activated devices that have approval from the US FDA to permit MRI procedures in patients under highly specific MRI conditions. In the case of cochlear implants, the US FDA has approved some implants for MRI compatibility. In the case of cardiac pacemakers, the results can sometimes be lethal, so patients with such implants are generally not eligible for MRI.

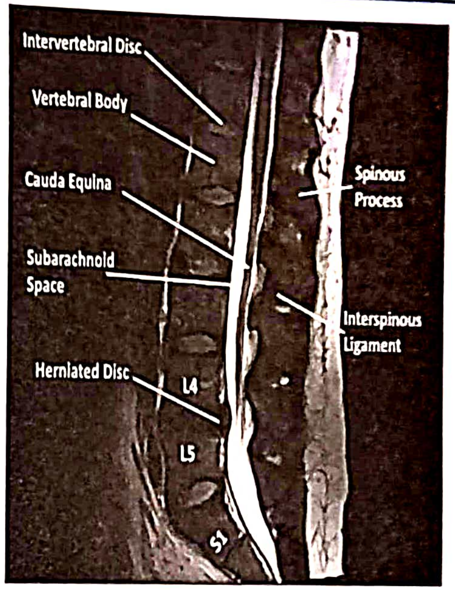

Fig 8.11: Contrast agents and implants

Key points of the chapter

- The full form of ECG is electrocardiogram. ECG will be helpful in diagnosing the cardiac diseases in about 20% of the cases. 65% of the cases can be diagnosed by accurate history and careful physical examination.
- A person with serious cardiac disease may show perfect ECG wave pattern and the person who is physically healthy may show bizarre ECG changes. That is the reason, wise clinician should correlate the clinical findings with ECG findings to make the accurate diagnosis.
- ECG is helpful in diagnosing chamber enlargement, myocardial ischemia and infarction, electrolyte imbalances – potassium in particular, systemic diseases affecting the heart such as rheumatic fever, beriberi, thyrotoxicosis, hypertrophic cardiomyopathy, as a response to the treatment for myocardial infarction, effects of certain drugs such as digitalis and lastly for the proper evaluation of artificial pacemakers if installed inside the body.
- ECG is indicated whenever the person is presented with unusual centralized chest pain, feeling tired or weak, unusual heart sounds such as S3 or S4 etc or murmur and when the person crosses 40 years, we have to do ECG.
- ECG contains waves, intervals, segments and J point. The waves observed are P wave, QRS complex, T wave. The intervals are PR interval, QRS interval, QT interval, PP interval and RR interval. Normal segments are PR segment, ST segment and TP segment. J point is the junction between S wave and ST segment.

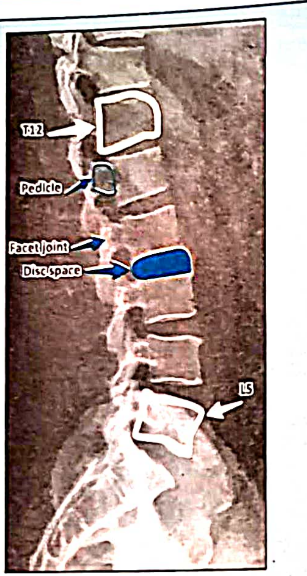

Fig 8.12: Spondylolisthesis L5 over S1:

- ⇨ Computerised Tomography (CT scan) is a medical imaging method employing tomography. Digital geometry processing is used to generate a 3 D image of the inside of an object from a large series of two dimensional X ray images taken around a single axis of rotation.
- ⇨ Ultrasonography: Diagnostic sonography is an ultrasound based diagnostic imaging technique used for visualizing internal body structures including tendons, muscles, joints, vessels and internal organs for possible pathology or lesions. In physics, the term ultrasound refers to sound waves with a frequency too high for humans to hear. Ultrasound images are mede by sending a pulse of ultrasound into tissue using an ultrasound transducer. The sound reflects the echoes off parts of the tissue; this echo is recorded and displayed as an image to the operator.
- ⇨ Magnetic Resonance Imaging (MRI) makes use of the property of nuclear magnetic resonance to image nuclei of atoms inside the body. MRI can create more detailed images of the human body than are possible with X rays.

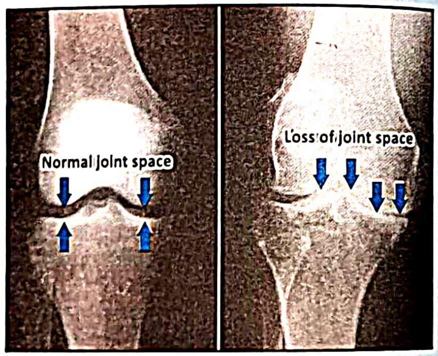

Fig 8.13: Osteoarthritis knee:

Probable questions may be asked in the examination

Short essays

- ⇨ Write in brief about ECG
- ⇨ Basics of ECG
- ⇨ Write a note on electrocardiography (ECG)
- ⇨ Write in brief about X Rays
- ⇨ X Ray
- ⇨ Write in brief about Ultrasonography
- ⇨ Write in brief about CT scan
- ⇨ Write in brief about MRI
- ⇨ USG
- ⇨ Write importance of X Ray in diagnosis of diseases with examples

Short notes

- ⇨ Write a short note on ECG
- ⇨ Write short note on X Rays
- ⇨ Write a short note on Ultrasonography
- ⇨ Write a short note on CT scan
- ⇨ Write a short note on MRI

- ⇨ What are the indications of ECG?

MCQs

1. **Normal PR interval is**
   a. 3 to 5 small squares;
   b. 5 to 7 small squares;
   c. 1 to 3 small squares;
   d. 7 to 10 small squares
   Answer -(a)
2. **The measurement of one small square in X axis is**
   a. 0.08 seconds;
   b. 0.04 seconds;
   c. 0.2 seconds;
   d. 1 second
   Answer -(b)
3. **The first negative deflection observed in QRS complex is termed as**
   a. Q wave;
   b. R wave;
   c. S wave;
   d. All of the above
   Answer -(a)
4. **Normally, the speed of recording of electrocardiogram is**
   a. 30 mm/ second;
   b. 10 mm/ second;
   c. 25 mm/ second;
   d. 35 mm/ second
   Answer -(c)
5. **Wide notched P wave > 2.5 mm is seen in**
   a. Left atrial enlargement;
   b. Right atrial enlargement;
   c. Left ventricular hypertrophy;
   d. Right ventricular hypertrophy
   Answer -(a)

***

Method of Case Taking at Bedside

9

Steps in diagnosis

Diagnosis of any disease involves 5 steps

1. **Proper case history–** it involves the elicitation and documentation of the subjective manifestations of the disease as well as of any further information relating to the family or past history, which may have a bearing on the case.
2. **Thorough physical examination–** involving the elicitation and recording of the physical signs of the disease
3. **Collection of all data pertaining to the disease in an individual–** to go for the further step of evaluation
4. **Selection of pertinent data and rejection of irrelevant data during the evaluation–** to make the most probable diagnosis. Proper interpretation of data depends to a great extent on the knowledge, reasoning power and experience of the clinician and on the accuracy of the data collected and completeness of the data.
5. **Suggesting a specific laboratory investigation or imaging technique to confirm or reject the diagnosis and revising the diagnosis to make the final diagnosis.** These investigations and imaging techniques must supplement and should not replace the time honoured methods of interrogation and physical examination. Although, investigation of a case has to be thorough, it need not be unnecessarily tedious, uneconomical or injurious to the patient.

➪ In clinical medicine, while making the diagnosis of the disease, two terms are frequently used. They are symptoms and signs. They are together known as clinical features of the disease. The word symptom refers to the subjective complaint i.e. the description of the complaint given by the patient. In this, the clinician cannot able to elicit the nature of discomfort, until the description given by the patient. For example, chest pain or headache, numbness of the hand or pins and needles or enlargement of the abdomen. Where as the term sign refers to the objective complaint i.e. the finding elicited by the clinician which cannot be identified by the patient unless informed by the clinician after physical examination. For example, tenderness of the abdomen or cyanosis of the tongue or clubbing or identifying ascites as the cause of the abdominal swelling after percussion etc.

➪ There are certain symptoms which may suggest the involvement of one part of the body and certain other symptoms may imply the involvement of any part of the body. The symptoms which may give the clue to the involvement of one particular part are called systemic symptoms and the ones which give the clue to the involvement of any part of the body are termed as constitutional symptoms. The examples for systemic symptoms are chest pain, itching, headache or burning micturition and the examples for constitutional symptoms are fever or weight loss etc.

To facilitate the ease in the diagnosis of the disease, four methods of diagnosis are practiced. They are

1. **Anatomical diagnosis–** helpful in deciding the probable system afflicted, further deciding the probable organ afflicted in a diseased individual
2. **Etiological or pathological diagnosis–** helpful in deciding the probable pathological process occurring in the diseased individual
3. **Hypothetical diagnosis–** matching the descriptions of the complaints with that of the textual description
4. **Diagnosis by exclusion method–** listing the diseases which are having similar complaints and excluding one by one by typical pathological process

Anatomical diagnosis: This type of the diagnosis will be helpful in narrowing the diagnosis of the disease, thereby helpful for the clinician in determining the stress to be given for the physical examination and further steps.

➪ The group of symptoms such as breathlessness on exertion, paroxysmal nocturnal dyspnoea, orthopnoea, breathlessness at rest, cough with pink frothy sputum, pain in right upper quadrant, bilateral pedal oedema, syncope, oliguria and nocturia are indicative of the involvement of cardio vascular disease.

➪ If an individual is presented with running nose, nasal blockage, headache, heaviness of the head, pain in the ear, post nasal drip, hoarseness of voice, cough, sputum, chest discomfort, breathlessness, haemoptysis implies the affliction of respiratory system

- ❑ Further, narrowing the organ of the affliction is possible. For example, if the person is presented with running nose, headache, post nasal drip, hoarseness of voice, suggests that the individual is suffering from upper respiratory disease
- ❑ If the patient is presented with cough, sputum, chest discomfort, breathlessness and haemoptysis, then it suggests that the patient is suffering from lower respiratory disease

➪ If an individual is presented with constipation or diarrhoea, pain in the umbilical region or hypogastric region, it suggests that the patient is suffering from alimentary canal dysfunction, lower alimentary canal in particular

➪ If an individual is presented with pain in the loin radiating to groin region, increased frequency of micturition, pain in the hypogastric region, burning micturition, painful micturition implies that the individual is suffering from urinary disease

➪ If an individual is presented with multiple joint pain with swelling, morning stiffness, cracking sound in the joints implies that the person is suffering from musculo skeletal disease

➪ If an individual is presented with altered state of consciousness, altered speech, reduced strength of the right upper and lower limbs implies that the person is suffering from neurological disease

Pathological diagnosis: In this type of diagnosis, based on the symptoms, one can come to a conclusion regarding the pathological process happening in the patient's body.

➪ If a person is presented with fever, bodyache, fatigue, it suggests that the patient is suffering from infectious disease

➪ If a person is presented with rapid development of symptoms within 2-4 months associated with weight loss implies that the person is suffering from neoplastic disease

➪ If 2 years old child is presented with the symptoms by birth it usually implies that the person is suffering from congenital disease

➪ If 26 years old individual is presented with loss of strength of both lower limbs following a fall from a tree indicates that trauma is considered to be the pathological process responsible for the disease manifestation

Hypothetical diagnosis

➪ In hypothetical diagnosis, we are going to match the descriptions given by the patient with the textbooks and thus making the diagnosis is hypothetical diagnosis.

⇨ If 17 years old female patient is presented with pain in the umbilical region shifting to the right iliac region for a period of 2 days associated with effortless vomiting and fever for 2 days. This description mimics the description of acute appendicitis. By matching the description of acute appendicitis of the textbook and the explanation given by the patient, hypothetical diagnosis is acute appendicitis.

⇨ If 28 years old female patient is presented with multiple joint pain with swelling, symmetrical smaller joint involvement for a period of 6 months, morning stiffness for a period of 4 months. This description matches with the description of rheumatoid arthritis. Hence the hypothetical diagnosis is rheumatoid arthritis.

Diagnosis by exclusion method

Let us discuss the example of chest discomfort. Chest discomfort is the one of the main presenting complaints can be observed in respiratory disease, cardio vascular disease, alimentary canal disease, musculo skeletal disease, neurological disease. The exact cause of the pain can be determining the nature of chest discomfort associated with other presenting complaints.

⇨ If the patient is presented with lateralised chest discomfort associated with short paroxysmal cough implies that the person is afflicted with respiratory disease.

⇨ If the patient is presented with central chest pain (retro sternal region), radiation of pain to the left shoulder or even upto fingers or to the neck or jaws, worsening of the pain by doing exercise or heavy meals or physical or mental stress and relief by rest or medication indicates that the person is suffering from cardio vascular dysfunction.

⇨ If the patient is presented with central chest pain having a relation with food intake, usually implies the alimentary canal dysfunction

⇨ If the patient is presented with chest discomfort which will be altered on change of posture usually indicates the musculo skeletal involvement

⇨ If the patient is presented with chest discomfort which is dermatomal and not crossing the midline, usually implies that the person is suffering from neurological dysfunction.

Thus, based on the nature of chronological order of the presenting complaints, we can rule out and confirm the diseases which show similar complaints.

Importance of case taking

⇨ Frequently affords a lead in the right direction or clue to the diagnosis. For example, if the patient presents with cough with pink frothy sputum associated with breathlessness, implies the patient is suffering from cardio-vascular illness.

⇨ Rules out certain diagnostic possibilities.

⇨ Suggests further avenues of investigation

⇨ To focus the observer's attention to the system/ systems involved in the manifestation of the disease

⇨ Symptoms usually precede signs – history gives early information than physical examination.

Preliminary data: (vital data/ identifying information/ particulars of the patient/ description of the patient/ bio-data of the patient): includes the informations which give personal details of the patient regarding his identification. These data include name, age, gender, occupation, religion, address etc. If the patient is hospitalised, then OPNo., IPNo., date of the admission, time of the admission, date of discharge, diagnosis, source of referral etc are required.

⇨ **Name:** The patient will be satisfied if he hears the name from the clinician. This in turn helps in developing the rapport among the clinician and the patient. In case of medico-legal cases, the correct name of the patient is essential. In laboratory investigations, the entry of correct name is highly essential.

⇨ **Age:** certain diseases are specific to some certain age groups. Congential anomalies, infections are common in childhood, appendicitis is common among young adulthood and malignancies are commonly observed among elderly people.

⇨ **Gender:** Apart from diseases related to genital system, certain diseases are common to particular gender. Gastric ulcer, carcinoma of oesophagus, carcinoma of colon are common among males. Myxoedema, chronic cholycystitis and carcinoma of breast are common among females.

⇨ **Place:** Certain diseases are common in certain places. For example, malaria is commonly observed in Mangalore as the city is endemic to malaria outbreak. Filariasis is observed commonly around Alappuzha, Kerala.

⇨ Occupation: Certain diseases are common among certain occupations. Lead poisoning is common in persons having the occupation of photography. Asbestosis is the common disease among asbestos factory workers. Varicose veins are commonly seen in persons having the occupation of long time standing such as traffic policeman.

Chief complaints/ main complaints: Here, the term chief complaint refers to the presenting complaints of the patient which are troubling the patient to the maximum extent. The complaint may be either single complaint or multiple complaints. While recording the chief complaints, following factors should be kept in mind.

⇨ Should be written in patient's own words along with duration

⇨ Should be in chronological order – for example, sneezing and cough without sputum for 3 days, shortness of breath for 2 days, sputum production for 2 days helps the clinician in making the clinical diagnosis of respiratory disease.

⇨ The exact duration of the chief complaint is of considerable importance in diagnosis. For example, the clinical significance of an abdominal pain of two hours duration is obviously quite different from the abdominal pain of several months or years duration. When the time factor is difficult to elicit from the patient, he may be asked to recall the last time when he was in good health.

History of present illness: History of present illness should be written in onset, duration, frequency, location, quality of pain, severity, course of the disease, aggravating and relieving factors, associated complaints and negative history. Some clinicians include treatment history in the history of present illness. The following factors should be taken care of while eliciting the history of present illness.

⇨ **Mode of onest:** sudden, gradual or incidious: Some diseases may show sudden onset of the symptom and some other show gradual onset of the symptoms and some in some symptoms, the onset cannot be identified as sudden or gradual and such onset is being termed as incidious. For example, in the patient of ischemic heart disease, the person suddenly develops the pain in the retrosternal region and in the patient gradually develops burning sensation in the epigastric region with sour eructation in the patient suffering from acid peptic disease. The person incidiously develops the pain in the low back on lifting the heavy weight. In this situation, the person cannot give stress on sudden or gradual onset, here he gives more stress on lifting the heavy weight.

⇨ **Duration of the presenting complaint:** In this point, one has to write the duration of the presenting complaint in the chronological order. For example, one patient develops the headache in the frontal region since 4 days followed by heaviness of the head since 3 days, followed by dry cough since 3 days, followed by running nose since 2 days and productive cough since 2 days. This description implies that the person is suffering from the illness related to upper respiratory airways.

⇨ **Location of the pain:** Location, radiation and character of the pain are of special importance while eliciting the history of pain. This section helps us to concentrate regarding the organ having pathophysiology. For example, if the person is presented with pain in the epigastric region, we have to infer the probable pathology occurring in the stomach or pancreas or oesophagus or liver. Similarly, pain in the retrosternal region suggests the probable pathology occurring in the heart or oesophagus or medial pleural involvement.

⇨ **Radiation of the pain:** Radiation of the pain gives a clue in the diagnosis. For example, if the person is presented with pain radiating from right loin to right groin, we can infer the diagnosis of renal calculi. Radiation of the pain from right hypochondriac region to inferior angle of right scapula implies the diagnosis of disorder of common bile duct. Radiation of the pain from epigastric region to the middle part of the chest implies the diagnosis of oesophageal disease. Radiation of the pain from low back to right lower limb suggests the diagnosis of right sciatica syndrome.

⇨ **Character of the pain:** Character of the pain also helps in the diagnosis of the disease. Burning type of pain in the palms and soles suggests the diagnosis of neurological disease. Burning type of discomfort in the epigastrium suggests the diagnosis of hyperacidity. Tearing type of pain in one particular part implies the accumulation of pus in the affected part of the body.

⇨ **Severity of the pain:** As far as the severity of the illness are concerned, three grades of severity are described – mild, moderate and severe. When the person can able to do his routine activities and which does not disturb the sleep of the individual, such type of pain is said to be of mild in nature. When the individual can able to do routine activities and gets sleep only after medications, such type of pain is said to be of moderate in severity. Even after consuming the medicines, the person cannot be able to do his routine activities or cannot able to sleep, then such type of pain is said to be severe in severity. Thus, one has to analyse the severity of the symptom.

⇨ **Course of the illness:** As far as course of the illness are concerned, three types of course are being described – worsening, improving or persistent. During the course of the illness, when the person is having mild severity of pain followed by severe variety of pain, then we can interpret the course of the illness is worsening. During the course of the illness, initially the person is presented with severe variety of pain, progresses to mild variety of pain in due course of time, then we can predict the improvement in the course of the illness. During the course of the illness, if the person says the same severity of the pain throughout the duration of the illness, we can predict the persistence in the course of the illness.

⇨ **Aggravating and relieving factors:** Analysis of the aggravating and relieving factors is helpful in the diagnosis of the disease. For example, worsening of the pain in the epigastrium on consumption of spicy substances implies that the person is suffering from acid peptic disease. Worsening of the pain in the low back on bending forwards we can predict the radicular pain. Improvement in breathlessness on consumption of diuretics usually suggests the diagnosis of congestive cardiac failure.

⇨ **Negative history:** Eliciting the negative history also helps in channelizing one's approach in the diagnosis of the disease. For example, in the patient who is suffering from yellowish discolouration of the sclera, we can predict the diagnosis of hepato biliary disease. The absence of yellowish discolouration of urine implies that the person is suffering from haemolytic jaundice. The absence of fever in the patient of jaundice rules out the infective aetiology of hepato biliary disease. The absence of steatorrhoea rules out the obstructive jaundice.

⇨ **Associated complaints:** When a person is suffering from an illness, he may not have only one symptom. He may have the association of other symptoms pertaining to one particular systemic affliction. The careful interpretation of these associated symptoms will be helpful in the diagnosis of the disease.

- ❑ For example, in the patient suffering from illness related to upper respiratory airways, he may be presented with headache, heaviness of the head, running nose, nasal blockage, pain in the ears, dry to productive cough, post nasal drip, hoarseness of voice.
- ❑ In the patient suffering from illness related to lower alimentary canal, the person can have a group of symptoms such as pain in the lower abdomen, constipation, diarrhoea, flatulence, frank bleeding per rectum, mucous mixed stools etc.

While eliciting the person's case history, following points should be given at most importance.

- ⇨ No leading questions should be asked.
- ⇨ Follow the chronological order
- ⇨ Show empathy towards the patients or be sympathetic in manner.

Past history/ previous history: should be enquired from the birth till the present day. There are certain occasions which may show some significance in the current diagnosis of the disease. Past history is categoried as childhood illnesses, adult illnesses. Among adult illnesses, following category is made - medical illness/ surgical illness/ menstrual and obstretric history and psychiatric history. contagious disease and past hospital admissions and major illness in the past should be enquired in the heading of past history.

⇨ **Childhood illness–** measles, rubella, mumps, chickenpox, rheumatic fever, scarlet fever, poliomyelitis etc

⇨ **Medical illness–** diabetes mellitus, hypertension, hepatitis, bronchial asthma, HIV infection

⇨ **Surgical illness–** type of operation such as appendicectomy, peptic ulcer perforation, haemorrhoids etc

⇨ **Obstretric history–** menstrual history, history related to birth control, history related to sexual function

⇨ **Psychiatric history–** diagnosis of psychiatric illness, hospitalisation for psychiatric illness and treatment.

Family history: There is a big difference between incomplete family history and negative family history. To elicit the complete family history one has to enquire about the age and health of the patient's grandparents, parents, siblings, spouse, children, grandchildren. If there is death among these people, cause of the death should be ascertained. Enquiry should be made regarding consanguineous marriage. Usually there will be a common food habit among family members. This may be a reason for the presenting illness.

Personal history

- ⇨ **Diet:** Vegetarian diet/ mixed diet
- ⇨ **Appetite:** Good/moderate/poor
- ⇨ **Sleep:** Sound/ disturbed
- ⇨ **Bowel habits:** Regular/ irregular
- ⇨ **Micturition:** Regular/ irregular

⇨ **History of addictions:** History of smoking/ alcohol/ narcotics/ betel leaf etc

Menstrual and obstetric history: in case of females, age of menarche, age of menopause in case of elderly people, history regarding menstrual cycle regarding duration of cycle, duration of menstrual flow, consistency of the flow should be enquired. In case of obstetric history, number of deliveries, normal or assisted delivery, number of abortions, number of living children should be enquired.

Socio-economical and environmental history: should be enquired to assess the surroundings of the patient's home and environment.

Review of systems: Review of the systems should be enquired to not to miss the involvement of different organ systems. Leading symptom of each organ system should be asked with the patient.

Case history is especially important in deciding the diagnosis of ischemic heart disease, epilepsy and psychiatric illnesses.

The following are the list of symptoms that a person may suffer from when there is disturbance in the organ system.

Symptoms related to disease of alimentary canal

⇨ Mouth
- ☐ Thirst and dryness of mouth
- ☐ Excess salivation
- ☐ Difficulty in swallowing, chewing and speaking
- ☐ Disorder of taste
- ☐ Soreness and pain

⇨ Oesophagus
- ☐ Dysphagia
- ☐ Pain
- ☐ Regurgitation
- ☐ Hemetemesis

⇨ Stomach and duodenum
- ☐ Pain abdomen
- ☐ Vomiting
- ☐ Hemetemesis
- ☐ Nausea
- ☐ Flatulence
- ☐ Disturbance of appetite
- ☐ Heartburn, water brash and eructations

⇨ Small and large intestines
- ☐ Pain abdomen
- ☐ Constipation
- ☐ Diarrhoea
- ☐ Tenesmus

⇨ Hepato biliary system
- ☐ Pain abdomen in right upper quadrant
- ☐ Jaundice
- ☐ Fatigue
- ☐ Bleeding per rectum (intestinal bleeding)
- ☐ Itching
- ☐ Abdominal distension

Symptoms related to kidney and urinary tract include

⇨ Disturbances in the act of micturition, including frequency, retention, incontinence and dysuria

⇨ Alterations in the amount of urine

⇨ Alteration in the appearance of urine

⇨ Pain – renal, ureteric, vesical and urethral

⇨ General symptoms of abnormal renal function

Symptoms of respiratory disease

⇨ Cough

⇨ Sputum production

⇨ Breathlessness

⇨ Chest pain

⇨ Hemoptysis

⇨ Upper respiratory tract symptoms– sneezing, running nose, nasal blockage, facial pain due to disease of nose and para nasal sinuses and hoarseness of voice

⇨ General constitutional symptoms fever etc

Symptoms of cardio vascular disease

⇨ Breathlessness – DOE, PND, orthopnoea

⇨ Chest discomfort

⇨ Bilateral pedal oedema

⇨ Palpitation

⇨ Cough with pink frothy sputum

⇨ Oliguria and nocturia

⇨ Pain in right hypochondrium

⇨ General constitutional symptoms like fever, weight loss

Symptoms of musculo skeletal disease

⇨ **Pain**– in joints, bone, ligaments, tendons, muscles

⇨ Deformity

⇨ Impaired movement

⇨ Cracking and creaking

⇨ Constitutional symptoms – fever, sweating etc

Symptoms of neurological disease

⇨ Higher mental functions
- ☐ Unconsciousness/ altered consciousness, delirium, photophobia
- ☐ Behavioural abnormality with speech defects

⇨ Cranial nerves
- ☐ Abnormal sensation of smell
- ☐ Visual abnormality, diplopia, squint
- ☐ Difficulty in mastication, loss of sensation over face
- ☐ Deviation of angle of mouth, facial asymmetry
- ☐ Loss of taste sensation
- ☐ Vertigo, deafness, tinnitus
- ☐ Nasal intonation or regurgitation
- ☐ Hoarseness of voice
  - ☐ 7Wasting of tongue

⇨ 7Motor system
- ☐ Loss of power, muscle weakness or clumsiness of movements
- ☐ Wasting or swelling (pseudohypertrophy) of muscles
- ☐ Fasciculation
- ☐ Flexor spasms
- ☐ Abnormal/ involuntary movements
- ☐ Pain in muscles
- ☐ Unsteady gait

⇨ Sensory system
- ☐ Anaesthesia/ paraesthesia/ tingling/ numbness
- ☐ Analgesia
- ☐ Hyperaesthesia/ hypoaesthesia
- ☐ Root pain
- ☐ Girdle like sensation
- ☐ Sensation of walking on cotton wool (tabes dorsalis)

⇨ Increased intracranial tension
- ☐ Headache
- ☐ Vomiting
- ☐ Convulsions
- ☐ Coma

⇨ Cerebellar system
- ☐ Vertigo
- ☐ Ataxia
- ☐ In coordination

⇨ Autonomic nervous system
- ☐ Retention of urine
- ☐ Incontinence
- ☐ Precipitancy, hesitancy
- ☐ Burning micturition (history of catheterisation)
- ☐ Impotence
- ☐ Diarrhoea/ constipation
- ☐ Abnormal sweating

⇨ H. Miscellaneous
- ☐ Fever (meningitis, brain abscess)

- ☐ Pain in neck (SAH, meningitis, cervical spondylosis)
- ☐ History of fall (seizure or epilepsy)
- ☐ Psychological changes like depression, euphoria, agitation, sleep disorder
- ☐ Discharge of pus from ear (meningitis)

Symptoms of urinary system disease

- ⇨ **Obstructive symptoms–** hesitancy (delay in beginning of micturition), poor flow, intermittency (continuous flow of urine during micturition will be absent), terminal dribble and pis en deux (a desire to pass urine shortly after finishing voiding of urine due to the presence of little amount of residual urine in the bladder)
- ⇨ **Irritative symptoms–** dysuria (painful micturition), urgency (the person cannot withstand the urge of micturition), nocturia (increased urine formation and voiding at night time) and frequency (number of passing the urine in 24 hours is more)
- ⇨ **Incontinence–** stress incontinence, urge incontinence and continuous incontinence
- ⇨ **Pain (renal colic)–** severe pain radiation from loin to groin
- ⇨ Haematuria
- ⇨ **Sexual dysfunction–** in case of males, impotence (inability to perform sexual intercourse), inability to ejaculate or premature ejaculation

Symptoms of male reproductive system disease: reduced libido, erectile dysfunction, orgasmic dysfunction

Symptoms of female reproductive system disease: reduced libido, dyspareunia, orgasmic dysfunction

Symptoms of endocrine disease

- ⇨ **Body size and shape**
  - ☐ Short stature
  - ☐ Tall stature
  - ☐ Weight gain
  - ☐ Weight loss
- ⇨ **Metabolic effects**
  - ☐ Tiredness
  - ☐ Weakness
  - ☐ Increased appetite
  - ☐ Decreased appetite
  - ☐ Polydipsia
  - ☐ Polyphagia
  - ☐ Nocturia
  - ☐ Tremors
  - ☐ Palpitation
  - ☐ Anxiety
- ⇨ **Local effects**
  - ☐ Swelling in the neck
  - ☐ Pain in the hands (carpal tunnel syndrome)
  - ☐ Bone and muscle pain
  - ☐ Protrusion of the eyes
  - ☐ Visual loss
  - ☐ Headache
- ⇨ **Reproduction:**
  - ☐ Loss of libido
  - ☐ Impotence
  - ☐ Oligomenorrhoea
  - ☐ Subfertility
  - ☐ Galactorrhoea
  - ☐ Gynaecomastia
  - ☐ Delayed puberty
  - ☐ Precocious puberty
- ⇨ **Skin**
  - ☐ Hirsutism
  - ☐ Hair thinning
  - ☐ Pigmentation
  - ☐ Dry skin
  - ☐ Excess sweating

Physical examination: Physical examination is the next step in the diagnosis of the disease. After the elaborate history taking, we will come to know which systemic examination we have to adopt.

Physical examination starts as soon as the clinician meets the patient and includes an assessment of general appearance, demeanour, personal hygiene. A remarkable number of diseases can be identified at first glance. For example, the patient of cerebro vascular accident or the patient of sciatica syndrome or the patient of hepatitis or the patient of obesity or ascites in case of alcoholic liver disease. Some are less obvious such as increased arterial neck pulsation in the form of visible jugular pulsation in the right side in case of right sided heart failure or blue sclera in case of osteogenesis imperfecta or pallor in case of iron deficiency anemia. None of the books give the method of physical examination, but provide a satisfactory and effective method of examination.

Preparation for the beginning of the physical examination

- ⇨ Reflect on one's approach to the patient
- ⇨ Adjust the lighting and environment
- ⇨ Make the patient comfortable
- ⇨ Check your equipment
- ⇨ Choose the sequence of examination
- ⇨ **Reflect on one's approach to the patient:**
  - ☐ When first examining the patient, feelings of insecurity are inevitable which will diminish on experience. Be straight forward. Try to appear calm, organised and competent.
  - ☐ Forgetting part of examination is common, especially at first. In that case, simply examine the area out of sequence, but smoothly and perform the examination thoroughly after reading the information related to the forgotten part.
  - ☐ Beginners need more time than expert clinicians – for example, assessment of lung sounds, heart sounds, analysis of muscle power etc. Beginners may take 8 to 10 hours for history analysis only whereas the expert clinician can complete the history and physical examination in 10 to 15 minutes. That is the reason, most of the patients will have panic/ anxiety towards physical examination. At the same time, they appreciate the concern about their problems and respond to the alertness of the student.
  - ☐ The skillful clinician examines each region of the body and at the same time, senses the whole patient, notes the wince or worried glance of the patient and shares the information that calms, explains and reassures.
  - ☐ At times, one may discover the abnormalities such as ominous mass or deep oozing ulcer. Always avoid showing distaste alarm or negative reactions.
  - ☐ Different doctors have different routines for examination of patients in different circumstances. One should develop a routine of examination which combines speed with thoroughness, sensitivity and alertness, but which disturbs the patient no more than necessary. In severely ill patients, it may be necessary to postpone a routine examination and to perform only the examination required for provisional diagnosis and treatment.
- ⇨ **Adjust lighting and environment**
  - ☐ Good lighting and quiet environment make important contributions to what one sees and hear, but may be hard to arrange. For example, sound of television or fan or hairs of the chest etc can give adventitious sounds. One should carefully analyse these sounds.
  - ☐ Tangential lighting is necessary for the assessment of jugular venous pressure, thyroid gland, apical impulse. It can also throw light on body contours, elevations and depressions. When the lighting is perpendicular to the surface,

we may miss the subtle changes in the body contours, minor swellings in the abdomen.

- ☐ Day time is better than artificial light which may mask the skin colour in case of assessment of icterus in the patient of jaundice.

⇨ **Check your equipment**

- ☐ Flash light/ pen light
- ☐ Tongue depressors
- ☐ Measuring tape
- ☐ Clinical thermometer
- ☐ Sphygmomanometer
- ☐ Stethoscope
- ☐ Gloves and lubricant (oral, vaginal and rectal examinations)
- ☐ Vaginal specula and equipment for cytological and bacteriological study
- ☐ Reflex hammer
- ☐ **Tuning fork** – one of 128 Hz and another one of 512 Hz
- ☐ Q tips, safety pins or other disposable objects for eliciting two point discrimination
- ☐ Cotton for testing light touch sensation
- ☐ Two test tubes (optional) for temperature sensation
- ☐ **Paper and pen/pencil** – for neurological evaluation

⇨ **Make the patient comfortable**

- ☐ A fairly complete examination can be carried out with patient sitting on a chair/ wheel chair, but it is difficult and will be limited. As physical examination may be made under all sorts of circumstances, every attempt is made to reassure and relax the patient. Be sure to close doors or draw curtains before doing physical examination.
- ☐ Exposure of the patient – **complete exposure or at least to underclothes and to lie on** the bed or couch covered with sheet or dressing gown. A chaperone should be present when a male doctor is examining the female patient and should always be present while performing rectal and vaginal examinations to reassure the patient and protect himself from subsequent accusations of improper conduct. Patients may feel awkward on being asked to undress and the necessity of this will have to be explained. A polite, gentle, calm approach will be necessary to reassure the patient.
- ☐ Draping the patient with gown or sheet is necessary. Your goal is to visualise one area of the body at a time. This preserves the patient's modesty. For example, during the examination of right breast, cover the left breast until and unless it is required. For the abdominal examination, only abdomen should be exposed. Genitals should be exposed only while examining for the evaluation of inguinal or femoral hernia. When one completes the examination, one has to tell the general impressions of one's observations.
- ☐ The examination must be performed thoroughly and completely using correct techniques for examining systems, organs and eliciting the signs. It is also necessary that significance of a physical sign is appreciated. E.g. hepatomegaly and descent of liver

⇨ **Choose the sequence of examination:**

- ☐ The key to a thorough and accurate physical examination is developing a systematic sequence of examination. The major goals of the such a sequence of examination is of 3 fold:
  - ⇨ Maximising the patient's comfort
  - ⇨ Avoiding unnecessary changes in the position
  - ⇨ Enhancing clinical efficiency
- ☐ The clinician must develop a method of examination which is both comprehensive and economical of time. His method should be applicable to all circumstances be at hospital or home. The essential point is that by the end of the examination, the patient has been examined adequately and no physical sign has been overlooked. There are exceptions to this rule for example, if the person is developing shock, the examination should be started first in which we can suspect the possible pathophysiology is happening.
- ☐ It is convenient to organise the technique of examination around systems such as respiratory system, cardio vascular system, per abdominal examination etc. Another way to examine the patient is by starting at the head and working down to toes, disregarding traditional bodily system examination. This is termed as regionwise examination. Either method is reasonable, but there are certain advantages conceptually and diagnostically in examination based on systemic examination; disadvantage it is time consuming.
  - ⇨ Move from head to toe.
  - ⇨ Avoid examining the feet before the examination of face/ mouth. Avoid examination of per vaginal examination before per rectal examination.
- ☐ General technique for examination of most systems, organs or lumps is by inspection, palpation, percussion and auscultation and it should be done preferably in day light e.g. jaundice.
- ☐ Sitting position is preferred in the patient of respiratory disease or during the examination of head and neck. Supine position of the patient is preferred in case of cardio vascular examination and per abdominal examination. With practice, one can develop the correct and complete sequence of examination.
- ☐ As a rule, physical examination is conducted most efficiently from right hand side of the couch. Left handed individuals occasionally find it more comfortable to examine from left hand side. But examiner should be prepared to examine the patient more than one position. E.g. chest movement from the foot end side; examination of neck from front and back; left ankle jerk – easier to elicit the jerk from left hand side. Working chiefly in one side helps one to master skills more quickly and promotes the efficiency of one's examination.
- ☐ Right sided examination has more advantages over left sided examination.
  - ⇨ Jugular veins on the right side are more reliable for estimation of jugular venous pressure
  - ⇨ Palpating hand rest more comfortably on apical impulse
  - ⇨ Right kidney is more frequently palpable.

Importance of physical examination

- ⇨ Complete physical examination does more than prevent the sickness and prolongs the lives of healthy men and women.
- ⇨ Helps in identifying health concerns and to explain the symptoms of the patient
- ⇨ Enhances patient doctor relationship
- ⇨ Significance of those general observations that can be made before formally examining the patient
- ⇨ Examination of the hands, head which can be performed without asking the patient to undress
- ⇨ Examination of the skin
- ⇨ Those other components of examination which assigned to any single system – includes examination of lymph nodes and breast

- ⇨ Examination and assessment of endocrine disorders
- ⇨ The student must repeatedly perform examinations to gain proficiency to clinicians to maintain their skills
- ⇨ **Special note:**
  - ☐ Avoid moving from patient's feet to face
  - ☐ Avoid examination from genitalia to face
  - ☐ Avoid examination from rectum to face or mouth
  - ☐ Avoid examination rectum to vagina

General Examination

General instructions in performing the physical examination:

- ⇨ Avoid superficiality in one's observations
- ⇨ Do not strive after what is rare and curious
- ⇨ Do not study only acute and severe cases
- ⇨ Be accurate in one's observations
- ⇨ Be complete in one's examination of the patient
- ⇨ Be systematic in the arrangement of the data

Temperature

Normal temperature control: The ability of human beings to maintain a stable body temperature depends on the control of heat regulating centre situated in the hypothalamus. The core temperature is regulated about a set point which differs in individuals but which is usually between 37° to 37.5° C regardless of the race and geography. Body temperature however does not remain absolutely constant throughout the day and all individuals have circadian rhytkhm with evening temperature 0.5° to 1° C higher than in morning. The daily rhythm is consistent with each individual and is independent of environment.

Fever: is persistent elevation of body temperature above the normal levels in an individual.

Measurement of body temperature

- ⇨ For this purpose, a clinical thermometer is used with a Fahrenheit or Centigrade scale, the latter now is preferred.

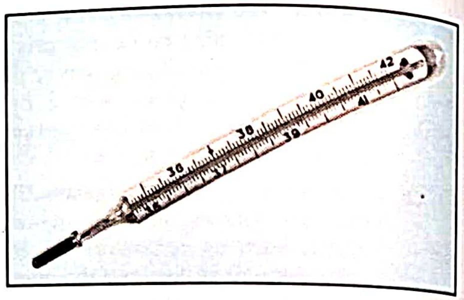

Fig 9.1: Clinical thermometer:

- ⇨ For accurate thermometry, following points should be considered.
  - ☐ The thermometer should be of reliable make and certified as accurate.
  - ☐ It should be kept in position for at least 2 – 3 minutes
  - ☐ Temperature may be recorded or observed in the mouth, axillae, groin or rectum. Latter two regions are used for recording the temperature in infancy and early childhood.
  - ☐ For oral temperature, the mouth must be kept closed, while breathing proceeds through nose.
  - ☐ For axillary recording, the skin must be moist, not chilled or moist with perspiration.
  - ☐ The mercury must be well shaken down before using the thermometer (used after washing).
  - ☐ In case of pyrexia, the temperature should be recorded every 4 to 6 hours in order to determine the type of fever.
- ⇨ **Normal temperature:** Measurement of oral temperature is 0.4° C below and axillary temperature upto 1° C below core temperature. Both are however more accurate methods than rectal readings which are affected by heat generated by faecal bacteria.

Table 9.1: Stages of body temperature variations in Fahrenheit and Centigrade scale

Term	Temperature in Fahrenheit	Temperature in Centigrade
Hypothermia	< 95° F	< 35° C
Subnormal	< 98° F	< 36.6° C
Normal	98.6° F	36.6° C – 37.2° C
Febrile	>99° F	>37.2° C
Hyperpyrexia	>107° F	>41.6° C

- ⇨ **Pathogenic mechanism of fever:** Increased body temperature is a sign of illness, particularly of infection. The common factor is the release of an endogenous pyrogen by phagocytic cells. The pyrogen is a small protein produced in response to a wide variety of infections, immunologic or toxic stimuli. The pyrogen acts on the thermoregulatory centre and information is then transmitted to the vasomotor centre, possibly by local prostaglandin production. In the meantime, heat generation is increased and heat loss is prevented thus raising the body temperature.
- ⇨ **Types of fever:**
  - ☐ **Continuous** – diurnal variations do not exceed 1.5° F in 24 hours
  - ☐ **Remittent** – diurnal variation exceed 1.5° F in 24 hours
  - ☐ **Intermittent (hectic or septic)** – fever that touches normal for a few hours during the day
    - ⇨ **Quotidian** – intermittent fever occurs daily
    - ⇨ **Tertian** – intermittent fever occurs on alternate days
    - ⇨ **Quartan** – intermittent fever that occurs in every 4th day
    - ⇨ **Irregular** – intermittent fever that does not follow any of the above pattern
  - ☐ It is now generally realised that, however, a variety of temperature patterns may be produced by any one disease and therefore such descriptions are therefore of little value.
  - ☐ A fever occurring in bouts lasting for days with afebrile phases is called relapsing or periodic fever and may occur in brucellosis, Hodgekin's disease, spirochaetal relapsing fever.
- ⇨ **Stages of fever:** In the course of fever, following stages are recognisable.
  - ☐ **Prodromal stage:** which may be absent
  - ☐ **Stage of onset or invasion:** Initial or pyrogenetic phase
  - ☐ **Stage of full development:** Stage of fastigium
  - ☐ **Stage of decline:** Stage of defervescence/ termination
- ⇨ The onset of fever may be incidious (gradual) or at times of step-ladder type in typhoid fever, or acute (abrupt) or sudden as in lobar pneumonia or malaria. The termination or fall of fever may be sudden (by crisis) as in pneumonia or gradual (by lysis) as in typhoid fever.
- ⇨ **Accompaniments:**
  - ☐ A sudden increase of temperature may be accompanied by a rigor or chill as in adults and by convulsions as in children
  - ☐ Chills or rigors are commonly observed in pyelonephritis, lobar pneumonia, malaria, septic fever, bacterial endocarditis
  - ☐ Recurrent rigors can occur in septicemia, pyemia and bile duct or liver sepsis
  - ☐ A sudden and marked drop of temperature can be seen in collapse, delirium or death even

➪ **Clinical causes:**

- ❑ **Infections** – bacterial, viral, ricketssial, spirochaetal, protozoal, fungal
- ❑ Neoplasms
- ❑ Allergic disorders
- ❑ Collagen vascular diseases
- ❑ Collection of pus
- ❑ Drugs
- ❑ Sarcoidosis and other granulomatous disorders
- ❑ Heat fever
- ❑ Factitious fever
- ❑ **Miscellaneous–** IBS, pulmonary emboli

Pulse Rate

➪ Pulse is counted after resting the patient for a few minutes to allow complete relaxation and then is counted.

➪ **Normal rate:** varies from patient to patient and even in the same patient from time to time. In adults, the rate/ minute range from 60 – 100, although usually lies between 70 – 75/ minute.

➪ The rate is higher in children and women and is increased by standing, eating, exercise and emotional factors.

➪ **Tachycardia:** The pulse rate > 100/ minute is termed as tachycardia and is abnormal and requires investigation, provided emotional strain and physical strain are not responsible for the same. This is observed in fever, thyrotoxicosis, infectious diseases such as streptococcal infection, diphtheria, septic fever, paroxysmal tachycardia (where rate is usually >160/ minute, attaining at times the rate of 300 or more/ minute

➪ **Bradycardia:** The pulse rate < 60/ minute is termed as bradycardia. This is seen in some as familial or hereditary characteristic, in athletic individuals (as low as 40/minute); during convalescence period in infectious diseases like pneumonia or influenza; during the course of enteric fever, jaundice, increased intracranial pressure, heart block, complete heart block in particular.

Respiratory Rate And Rhythm

➪ In health, respiratory rate is usually between 16 – 20/ minute, being somewhat higher in females. The respiratory rate is higher in children and infancy – 40/ minute at the time of birth.

➪ The rate of respiration[1] is greatly affected in health by exertion, excitement and emotion. The rhythm is normally regular, may become irregular during excitement, emotion and self consciousness.

➪ Normal inspiration is an active process dependent on muscular action (inter-costal muscles, diaphragm, abdominal muscles) and associated with upward and outward movement of the ribs resulting in expansion and upward movement of thorax. Normal expiration is slightly longer than inspiration, on the other hand, is a passive process associated with inward and downward movement of the ribs and a falling in of the chest wall.

➪ **Abnormal rate of respiration:**

- ❑ **Increased–** in case of excitement or exertion (physiological); fever, diseases of lungs and heart, painful shallow breathing of pleurisy or peritonitis (pathological)
- ❑ **Decreased–** narcotic poisoning (opium, morphine), endocrine diseases associated with hypometabolism, uremia, diabetic coma, increased intracranial pressure

➪ **Anbormal rhythm:**

- ❑ Excitmenent or emotion (physiological)
- ❑ **Irregular rhythm–** meningitis, coma, peripheral circulatory failure, preterminal event in moribund patients
- ❑ **Periodic breathing–** special variety of respiratory arhythmia where paroxysms of hyperpnoea alternate with phases of apnoea
  - **Cheyne Stokes breathing–** in deep sleep, narcotic poisoning, cardio vascular diseases, respiratory diseases, intra cranial diseases characterised by a gradual waxing and waning movements of respiration during the phases of hyperpnoea.
  - **Biots breathing–** associated with meningitis, characterised by sudden increase and decrease of respiration during paroxysms of hyperpnoea.
  - **Suspirious breathing (sighing respiration)–** special variety of respiratory arrhythmia associated with nervous excitement, fatigue, neurocirculatory asthenia, characterised by interruption of normal respiration by occasional long and deep sighing breaths.
  - **Apneustic breathing–** characterised by a slow respiratory rate with respiration stopping in maximal inspiration and seen in mid-pontine lesions.
  - **Ataxic breathing–** respiration consists of series of irregular gaps or short inspiratory efforts terminating abruptly – seen in medullary lesions.

➪ **Prolongation of respiratory phase:**

- ❑ **Prolonged inspiration–** seen in obstructive lesions of upper respiratory tract, particularly of larynx, glottis produces stridulous breathing
- ❑ **Prolonged expiration–** seen in obstructive lesions of below the level of larynx particularly in bronchial asthma, emphysema – prolonged wheezy expiration giving rise to asthmatic breathing
- ❑ **Prolonged inspiration and expiration–** acute alcoholic or narcotic poisoning, diabetic coma, uremia, cerebral tumour – giving rise to so called slow breathing or Kussmaul breathing.

➪ **Altered respiration pulse ratio:**

- ❑ Normal: 1:4
- ❑ 1:2 or 1:3 in pneumonia or congestive cardiac failure (CCF)
- ❑ 1:6 or 1: 5 in opium or morphine poisoning

➪ **Abnormal breathing:**

- ❑ **Abdominal type of breathing in female–** suggest thoracic disease – acute pleurisy, malignancy, arthritis of spine
- ❑ **Costal type of breathing in male or child–** suggest the possibility of intra abdominal diseases such as ascites, massive hepatomegaly, splenomegaly, large tumour, peritonitis, diaphragmatic pleurisy
- ❑ Exaggeration of normal type of respiration may indicate certain disease
  - Entire thoracic type of breathing in female in stead of thoraco abdominal type) implies intra abdominal disease or diaphragmatic paralysis
  - Entire abdominal type of breathing in males in stead of abdomino thoracic type implies dry pleurisy or intercostal muscle paralysis.

Constitution: clinical classification of body type of individual

➪ **Aesthenic (hypoaesthenic)–** thin, long and undeveloped body with long neck, flat chest, prominent hypogastrium, slender fingers and with a proclivity to neurasthenia and visceroptosis (longilinear somatic constitution with vertical heart)

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[1] Normal Pulse respiration ratio is 4:1

- **Normosthenic (orthosthanic)–** with a normal average body build
- **Sthenic (hypersthenic)–** broad, short and fat with short neck, muscular chest and large stumpy finger (brevilinear somatic constitution with horizontal heart)

Stature And Span

- **Stature:** On the basis of stature or total height from the tip of the head to the soles of the feet, individuals can be classified as normal, tall or short. The term giant or dwarf is applied to an individual with an abnormally large or small stature. Stature will depend on race, heredo-familial factors, gender etc (males are taller than females)
- **Upper and lower measurements:** Stature of an individual is sum-total of upper (top of head – upper border of symphysis pubis) and lower measurements (upper border of symphysis pubis to soles of the feet)
- **Span:** The span is the distance between the tips of two fingers of two outstretched hands with arms held horizontally.
- Normally, stature and span are equal and so are upper and lower measurements.
- Stature will be more than span in case of premature or early epiphyseal union as in adrenal cortex tumour with precocious puberty. In this situation, upper measurement will be more than lower measurement.
- Span will be more than stature and lower measurement will be more than upper measurement in case of delayed or retarded epiphyseal union as in hypogonadism or eunuchoidism or other endocrine disorders such as cretinism

Stature of an individual:

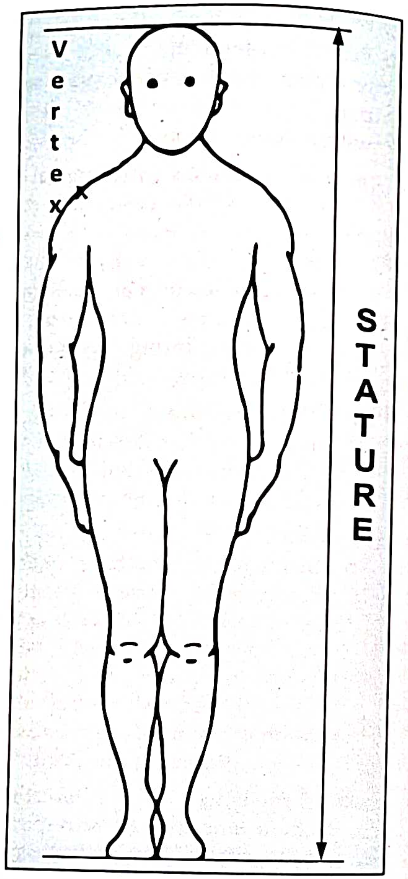

Fig 9.2: Stature of an individual

Span of an individual:

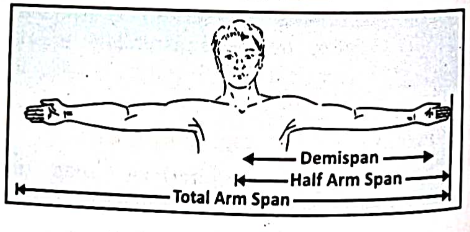

Fig 9.3: Span of an individual

Nourishment

- State of nutrition will depend mainly on

the distribution of adipose tissue or fat in the body. On this basis, the individuals can be classified into normal, overweight (fat/obese) and underweight (thin/lean).

- Factors regulating the body weight are problems of metabolism dependent on caloric intake, energy expenditure, metabolism of fat, protein, carbohydrate, minerals, water, appetite, mode of life, endocrine factors, heredity, constitution, personal habits, upbringing and environmental factors.

Table 9.2:Gradings of Body Mass Index (BMI)

Body mass index (BMI)	w/h2
Normal BMI	18 – 25
Under nourishment	< 18
Over nutrition	>25 upto 30
Obesity	>30
Hyperobesity	>40

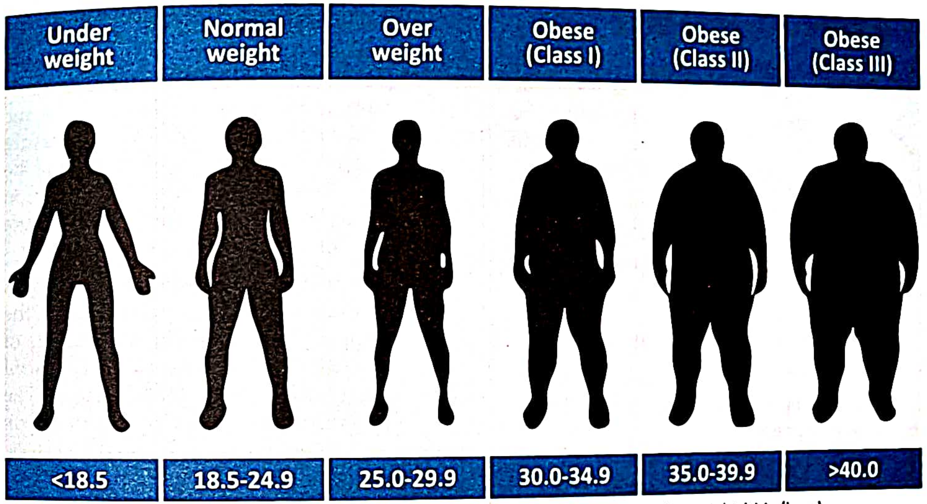

Fig 9.4: Classification into normal, overweight (fat/obese) and underweight (thin/lean)

Height And Weight

Height

- Height should be taken into consideration with age and build of the patient. Height may be determined by ethnic and genetic factors and average height of other members of the patient's race and family must be taken into account.
- Increased height – gigantism – increased activity of anterior pituitary occurring before puberty, other features of pituitary hyperfunction may also be present. A tall thin build with relative long limbs is characteristic of eunuchoidism and Marfan's syndrome.
- **Decreased height:**
  - ☐ Inherited skeletal anomalies such as achondroplasia
  - ☐ Certain diseases acquired in early life before growth is complete.
  - ☐ Impaired nutrition from faulty diet (coeliac disease, cystic fibrosis of pancreas)
  - ☐ Conditions associated with chronic hypoxia (bronchial asthma and congenital heart disease)

- ☐ Endocrine disorders–hypopituitarism, untreated cretinism, prolonged corticosteroid therapy for asthma and other childhood ailments
- ☐ Chronic renal disease with calcium depletion (renal rickets)

Weight

- ⇨ Weight may be permanently below or above average, but more significant in cases of rapid change in weight.
- ⇨ **Increased weight:**
  - ☐ **Familial characteristic** – occurring at same age in different members; aggrevated by over eating and lack of exercise. Obesity of this kind is of great importance in favouring the development of many diseases.
  - ☐ **Diabetes mellitus,** atheroma, gall stones and those due to muscle deficiency and gravitational stresses such as inguinal hernia, hiatus hernia, diverticulitis, uterine prolapse, varicose veins, osteoarthritis
  - ☐ Obesity in childhood as a temporary phenomenon which rectifies itself soon after puberty.
- ⇨ **Decreased weight:**
  - ☐ Irregularities in meals arising from change in occupation or loos of interest in food
  - ☐ Cachexia – serious wasting, greenish or earthy pallor and altered texture of the skin (dry and wrinkled)

Blood Pressure

- ⇨ Two instruments are required for the assessment of blood pressure, a sphygmomanometer and a stethoscope. The sphygmomanometer consists of a manometer, an inflatable bladder with cuff and inflation-deflation device.
- ⇨ The patient should be comfortably seated or in the recumbent posture, completely relaxed and neither tired nor emotionally upset. The arm is freed of clothing upto the shoulder and supported comfortably with the elbow flexed and at the level of the heart.
- ⇨ Two types of assessment of blood pressure is practiced – palpatory method and auscultatory method.
  - ☐ **Palpatory method:** - The systolic pressure must be estimated before using the stethoscope. With the arm extended and palms facing upwards, the middle of the cuff-bladder must be placed over the brachial artery. The brachial artery must be at the level of heart. The radial artery is palpated during the inflation of the sphygmomanometer. Systolic pressure is thus recorded by slowly deflating the cuff. During deflation, the pulsation appears on the radial artery. That is the level of systolic pressure.
  - ☐ **Auscultatory method:-** The diaphragm of the stethoscope is placed uder the edge of the cuff for better hearing of the sound. The stethoscope is placed gently over the brachial artery. The pressure is then raised by 30 mm above the previously estimated systolic pressure by palpatory method. Next reduce the pressure by deflation at 2-3 mm/ second or pulse beat. The disappearance of the sound gives the diastolic pressure.
- ⇨ Blood pressure is measured routinely. The first sound heard as Hg column falls is systolic pressure and disappearance of sound (5th phase of Korotkoff sound) is the diastolic pressure.
- ⇨ In case of suspicion of congenital cardiac disease or peripheral vascular diseases, BP is measured in both arms. Upto a difference of 15 mmHg is considered as normal. Leg pressure is usually 20 mmHg higher than arm pressure.
- ⇨ **Causes of difficulty in hearing Korotkoff sounds:**
  - ☐ AS (Aortic Stenosis) of slow rise in pulse wave
  - ☐ Small pulse pressure
  - ☐ Slow and poor blood flow to the limbs
- ⇨ Techniques to improve the audibility of the Korotkoff sounds:
  - ☐ Make the subject to open and close the wrist for about 10 times.
  - ☐ Inflate the cuff quickly which acts as tourniquet during inflation during inflation before arterial occlusion pressure is reached.
  - ☐ If sounds are still soft, elevate the arm before inflating the cuff. This empties the arteries beyond the cuff thus increasing the flow gradient.

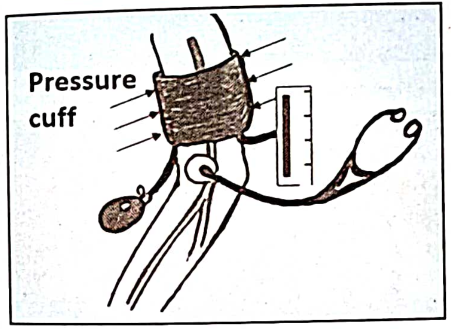

Fig 9.5: Method of blood pressure reading

Face

- ⇨ Facial expression, particularly eyes
- ⇨ E.g. Parkinson's disease – expressionless face
- ⇨ Depression
- ⇨ Hypothyroidism
- ⇨ Thyrotoxicosis
- ⇨ Acromegaly
- ⇨ III and IV cranial nerve palsies
- ⇨ Parotid swellings – evident on inspection of face, tendon blilateral swelling of mumps, unilateral swelling with reddening of skin in case of acute parotitis

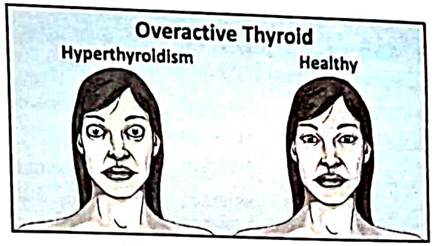

Fig 9.6: Overactive Thyroid

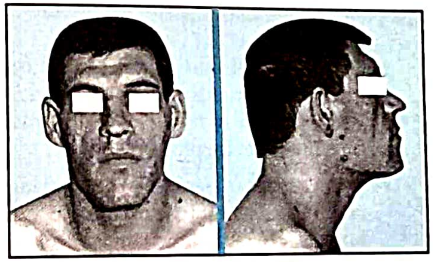

Fig 9.7: Image of patient of acromegaly

Cheeks

- ⇨ Give information regarding the patient's health
- ⇨ Pale in anemia, hypopigmentation
- ⇨ Pale and puffy in nephrotic syndrome
- ⇨ Malar flush – mitral stenosis
- ⇨ **Butterfly rash–** Systemic lupus erythematosus
- ⇨ Telangiectasia over face – liver disease

Eyes

- ⇨ **Ptosis, squint, irregularity of pupils–** other evidences of oculomotor paresis implies diseases of nervous system
- ⇨ **Exophthalmos– (proptosis)–** primary hyperthyroidism; tumours affecting orbit or thrombosis of cavernous sinus
- ⇨ **Enophthalmos –** serious wasting diseases, dehydration (in the latter, gentle pressure

reveal abnormal softness and inelasticity of eyeball)

- ⇨ **Abnormal hardness** on palpation of the eyeball implies trachoma
- ⇨ **Inspection of conjunctiva**, sclera, cornea, iris, lens should be performed.
  - ❑ **Conjunctiva–** pallor of anemia, chemosis (oedema of eyelids) due to hypoproteinemia, increased vascularity to eyes in respiratory failure and polycythemia; haemorrhage in bleeding diatheses and fracture of the skull
  - ❑ **Sclera–** yellowish in jaundice; inflammatory changes in episcleritis in the patients of rheumatoid arthritis; blue in case of fragilitus ossium
  - ❑ **Cornea–** arcus senilis (whitish ring near sclerocorneal junction) in old age implies hyperlipidemia associated with arterial atheroma
  - ❑ **Iris–** iritis in case of rheumatoid arthritis, ulcerative colitis and sarcoidoisis; discolouration and distortion of the iris and irregularity of the pupil in case of operated cases of cataract etc.
  - ❑ **Lens–** diabetes mellitus and prolonged hypocalcemia predispose the manifestation of cataract

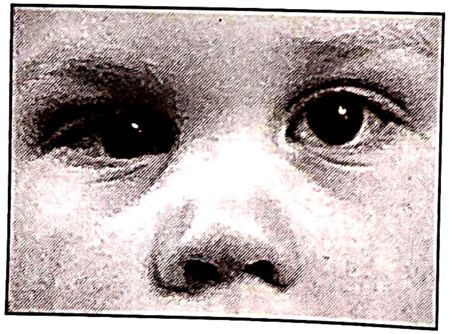

Fig 9.8: Image of 6th cranial nerve palsy

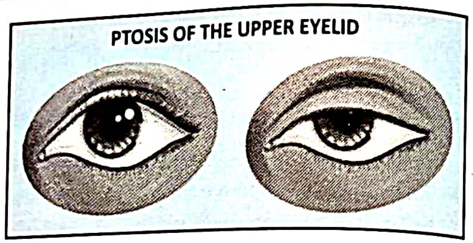

Fig 9.9: Ptosis of the upper eyelid

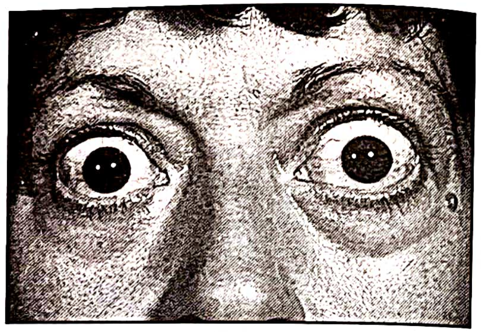

Fig 9.10: Eye of patient of hyperthyroidism

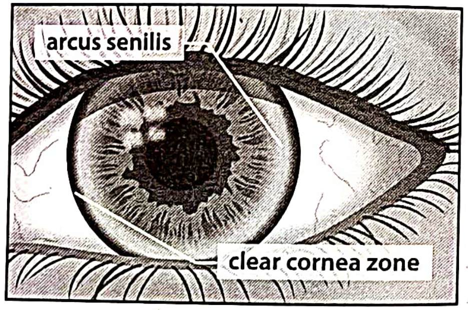

Fig 9.11: Arcus Senilis

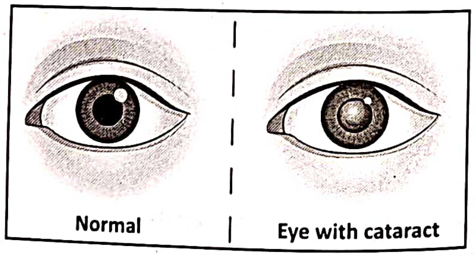

Fig 9.12: Norma and Eye with Cataract

Lips

- ⇨ Dry and cracked in most of the illnesses
- ⇨ Collection of epithelial debris in lips in case of fever, uremia
- ⇨ Skin lesions in lips in case of herpes simplex
- ⇨ Pallor in case of anemia
- ⇨ Bluish discolouration in case of cyanosis

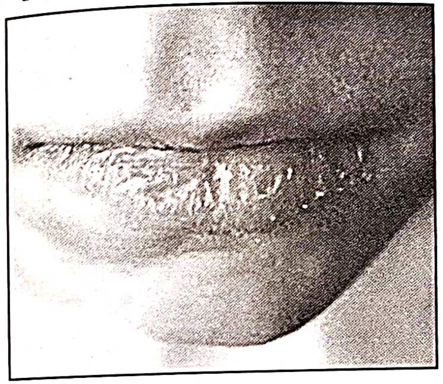

Fig 9.13: Dry and cracked lips

Nose

- ⇨ **Large** – in case of acromegaly due to partly subcutaneous thickening and partly due to bony overgrowth
- ⇨ **Saddle nose** – in case of congenital syphilis
- ⇨ **Butterfly wing** – in case of systemic lupus erythematosus

Skin

- ⇨ Pallor, yellowishness, pigmentation, cyanosis, cutaneous eruptions etc are noted
- ⇨ Pallor depends upon thickness and quality of the skin. Pallor occurs in persons with thick or opaque skin, who are always pale
  - ❑ Hypopituitarism
  - ❑ Where. blood flow in capillaries is diminished such as shock, syncope or LVH (left ventricular hypertrophy), locally in a limb which is deprived of blood supply
  - ❑ Raynaud's disease – in fingers and toes, arterial spasm occurs when exposure to cold
  - ❑ Generalised pallor in severe anemia
  - ❑ Colour of mucosae of mouth and conjunctivae also give better indication of anemia, as also the creases of palms of hand

a. **Yellowish discolouration:**
  - ❑ Pale lemon yellow tint – haemolytic jaundice
  - ❑ Dark yellow or orange tint along with scratch marks – obstructive jaundice

b. **Pigmentation:**
  - ❑ Pigmentation of buccal mucosa, exposed skin and parts subject to friction – Addison's disease
  - ❑ Café-au-lait (milky coffee) spots – pigment patches ranging from freckling of axillae to large (>5 cm long) areas on limbs, trunk or face characteristic of Von Recklinghausen's disease

c. **Rashes:**
  - ❑ **Macular** – measles, scarlet fever, haemorrhagic rashes
  - ❑ **Papular** – chickenpox, eczema, psoriasis
  - ❑ **Vesicle** – herpes zoster (shingles),
  - ❑ **Bullous** – burns and scalds, erysipelas, pemphigus
  - ❑ **Pustular** – acne vulgaris
  - ❑ **Wheals** – urticaria

Cyanosis: Bluish discolouration of the skin, mucosa due to the accumulation of deoxygenated blood in the tissues which contains excess carbon dioxide

- ⇨ **Two types are described–** central and peripheral. It is very important to differentiate the types of cyanosis. Take the cyanosed finger and dip the finger into warm water for a period of 10 minutes. If the cyanosis is disappearing, then we can conclude the probable cause of cyanosis is peripheral cyanosis. If the cyanosis does not disappear, then, diagnosis of central cyanosis is made.

- **Central cyanosis:**
  - ☐ Cyanosis appears in the tongue, lips
  - ☐ The cause is imperfect oxygenation of the blood in the lungs
  - ☐ The clinical conditions are heart failure, lung diseases
- **Peripheral cyanosis:**
  - ☐ Peripheral cyanosis appears in the palms and soles, ear lobule etc.
  - ☐ The cause is reduced concentration of oxygen in the capillaries when flow of blood is slowed
  - ☐ Clinical conditions are peripheral circulatory failure

Oedema: Oedema is nothing but the accumulation of fluid in the interstitial spaces and serous cavities. This is recognised by pallid and glossy appearance of the skin over the swollen part, but its doughy feel, pits on pressure.

- Oedema of arm when malignant glands constrict the axillary vein.
- Oedema of the lower limb – thrombosis of the femoral vein or popliteal vein
- Oedema of the upper part of the body – in case of intrathoracic tumours
- Oedema of lymphatic obstruction – non pitting type of oedema is seen
- Localised oedema – due to increased capillary permeability, in case of angioneurotic oedema or giant urticaria, cutaneous or subcutaneous inflammation

Hands

- Carefully examine the strength of the grip as one does the shake hand. This is a rough indicator of muscular abnormality.
- General shape of hands, state of the joints, character of nails, presence or absence of finger clubbing, presence of nailbed infarcts, staining with nicotine
- Heberden's nodes – in the patients of osteoarthritis
- Swan neck deformity, button hole deformity, ulnar deviation of the fingers, z deformity are confirmatory of the diagnosis of rheumatoid arthritis
- Characteristic movements such as snake-writhing movements in the hands are observed in case of athetosis observed in cerebral palsy
- Specific posture of hand in case of tetany
- Tremors – seen in nervousness, senility, parkinsonism, thyrotoxicosis, alcoholism, multiple sclerosis etc
- Dupuytren's contracture – thickening of palmar fascia
- Clubbing – swelling of distal part of the fingers and toes seen in cardiac and respiratory diseases, subacute bacterial endocarditis.

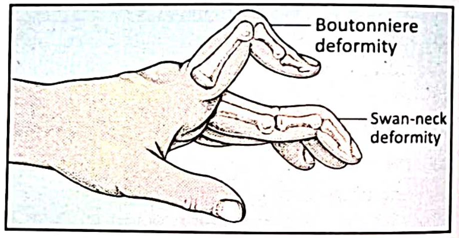

Fig 9.14: In the patient of rheumatoid arthritis

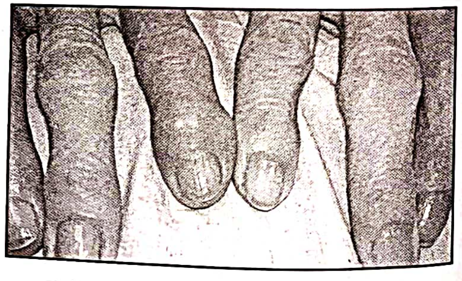

Fig 9.15: Heberden's nodes in osteoarthritis

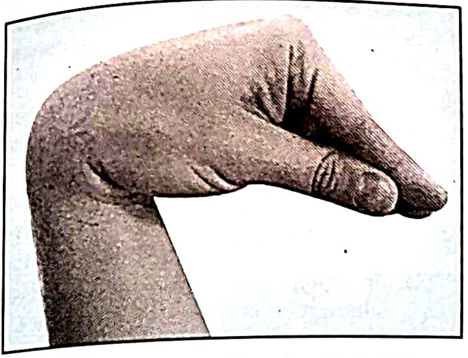

Fig 9.16: Seen in pathient of Hypocalcemia

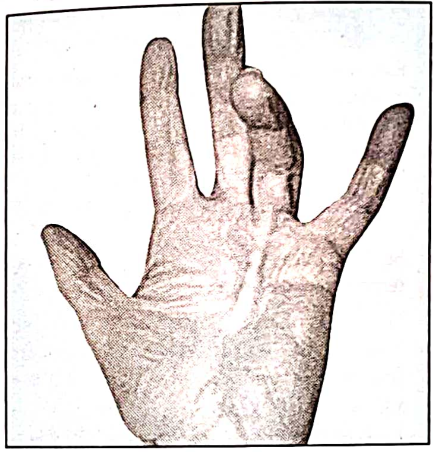

Fig 9.17: Dupuitren's contracture in palmar fascia thickening

Feet

- Legs should be specially inspected for evidence of circulatory disorders – arterial and venous diseases
- Chronic impairment of venous return may lead to varicose veins with eczema, pigmentation or ulceration over the lower part of the legs
- Arterial ischemia usually presents with pallor, cyanosis, coldness, loss of hair, anaesthesia, trophic changes such as gangrene
- Unilateral swelling in the lower limb behind knee joint may be associated with either Baker's cyst or ruptured deep vein thrombosis. Deep vein thrombosis is confirmed by Homan's sign (pain in the calf region on dorsiflexion of great toe). This is associated with tenderness in the thigh/ calf region along with oedema and increase in girth of one leg.
- Bone deformities such as bow legs (genu varum deformity), knock knees (genu valgum deformity) can be observed in the patients of osteoarthritis

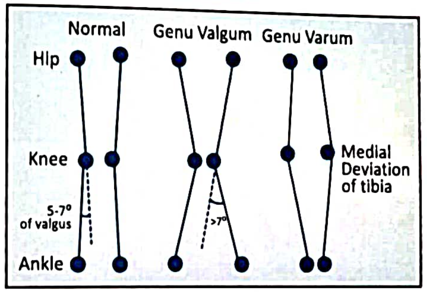

Fig 9.18: Genu valgum and genu varum deformities in osteoarthritis

Neck

- Neck should be inspected and palpated. Palpation of the neck should be performed by standing behind the patient.
- Enlargement of jaws are seen in infection of the tonsils
- Lymph glands below the jaw are afflicted in metastasis from the cancer of the mouth
- Groups of lymph nodes in the neck behind the sternocleidomastoid muscle associated with scar marks indicates the diagnosis of tuberculosis
- Thyroid gland– local enlargement in the neck, moves with larynx during the swallowing which can be demonstrated by asking the patient to drink water. Size and shape of the gland should also be noted.
- Pulsations in the neck should also be noted. For example, forcible pulsation of the carotid artery is seen in aortic

incompetence, visible jugular venous pulsations are implying the diagnosis of congestive cardiac failure.

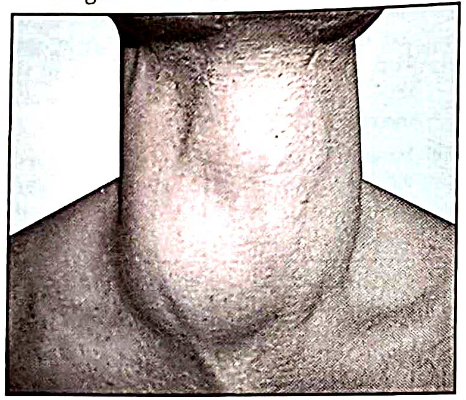

Fig 9.19: Neck swelling in goitre

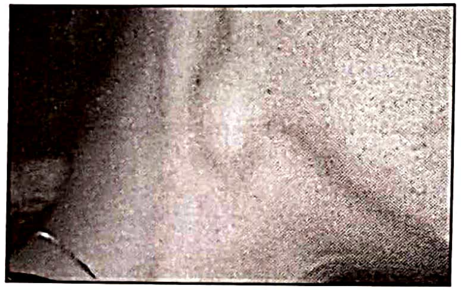

Fig 9.20: Lymph node enlargement

Genitalia

- ⇨ The size and form of genitalia are of special importance in case of the diagnosis of endocrine disorders.
- ⇨ Penis and testis fail to reach adult proportions in several types of infantilism; hypopituitarism, hypothyroidism, eunuchoidism. Here, normal sexual functions are altered and secondary sexual characters (deepening of the voice, growth of hairs on the pubis and masculine sites) do not develop at puberty.
- ⇨ In females, the main sign of genital infantilism is failure to menstruate; pubic hairs may be delayed in appearance and general body configuration remains sexless without breast development
- ⇨ Sexual precocity found in adrenal cortical hyperplasia or tumours and in certain endocrine diseases.
  - ☐ Male children develop a penis of adult size in case of adrenal tumours (erection and ejaculation may occur)
  - ☐ In females, precocity may develop along masculine or feminine lines. In the former, clitoris may enlarge and hirsutism appear as in adreno genital syndrome. In the latter, normal sexual characters are unduly early.
- ⇨ External genital organs may also exhibit evidence of local disease, for example, presence of urethral or vaginal discharge seen in gonorrhoea or other local infections.

Character and Distribution of Hair

- ⇨ Serious illness can result in dryness and temporary hair fall.
- ⇨ Hypothyroidism – thick, coarse, scanty hairs falling out particularly over frontal region and outer 1/3rd of the eye brows.
- ⇨ More complete loss of hair – axillary, pubic and facial hairs may be observed in anterior hypopituitarism, Addison's disease and chronic hepatic failure
- ⇨ Total loss of hair can be seen in cytotoxic drug therapy
- ⇨ Patchy loss of hair is seen in alopecia areata and in anxiety
- ⇨ Loss of hairs in the legs in males can be seen in arterial insufficiency
- ⇨ Excess hairs in females over moustache and limbs is not necessarily pathological, can be seen after menopause.
- ⇨ Gross distribution over trunk and limbs with moustache and beard formation requiring shaving may be seen in virilism and various types of adrenal tumours.

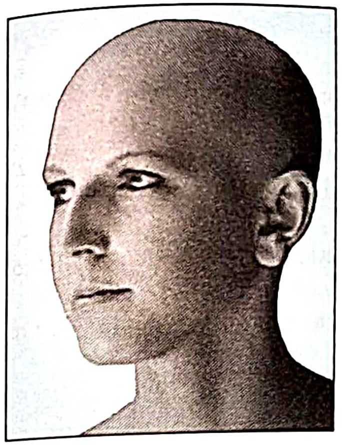

Fig 9.21: Alopecia totalis

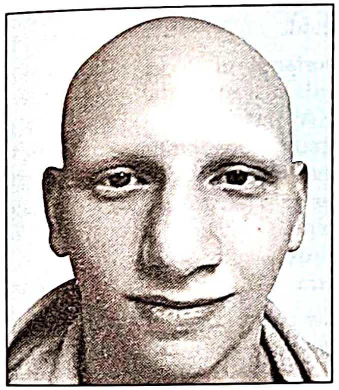

Fig 9.22: Alopecia universalis

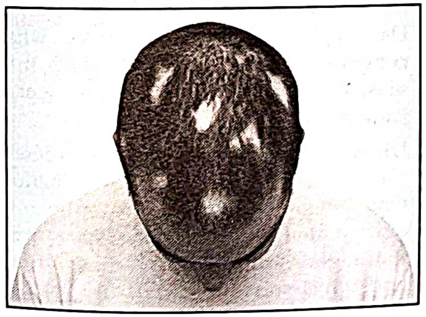

Fig 9.22: Alopecia areata

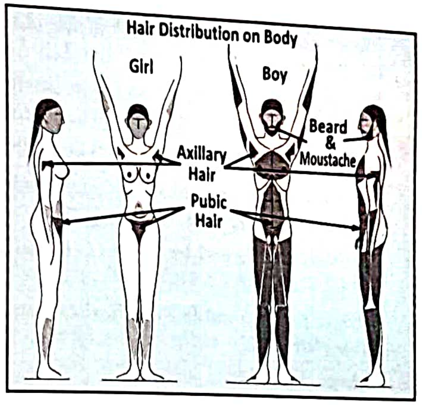

Fig 9.24: Hair Distribution on Body

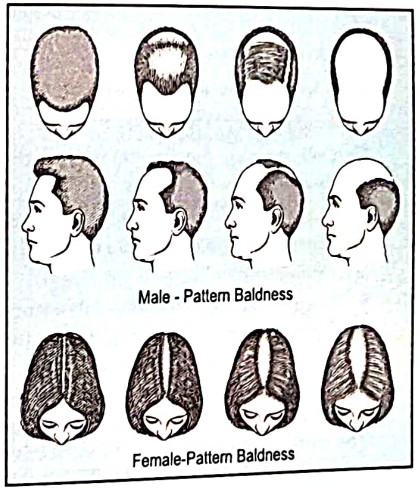

Fig 9.25: Female-Pattern Baldness

Chapter Resources

1. Physical diagnosis – a textbook of symptoms and physical signs by Rustam Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
2. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie & Christopher C Evan, 12th Edition, Butterworth Heinmann publications, New Delhi, 1997
3. A manual of clinical surgery by S Das, 4th Edition, Published by Dr S Das, Calcutta, 1998
4. Savill's system of clinical medicine revised & edited by E C Warner, 14th Edition, CBS Publishers, Delhi, 1998
5. The Merck's Manual by Robert S Porter & Justin L Kaplan, 19th Edition, Merck Sharp & Dohme Corp, 2011
6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

Key points of the chapter

- ⇨ Diagnosis involves 5 steps:
  1. Careful and elaborate case history
  2. Methodical physical examination
  3. Collection of data pertaining to the disease in an individual
  4. Selection of pertinent data and rejection of irrelevant data during the evaluation
  5. Suggesting the specific laboratory investigation or imaging technique to confirm or reject the diagnosis
- ⇨ In clinical medicine, two terms are frequently used. Symptoms and signs. The term symptom refers to the subjective complaints of the patient, discomfort felt by the patient such as chest pain, headache etc. whereas the term sign refers to the objective complaints of the patient, elicited by the clinician such as clubbing, tenderness of abdomen etc.
- ⇨ To facilitate the ease in diagnosis, four methods of diagnosis are practiced. They are anatomical diagnosis, etiological or pathological diagnosis, hypothetical diagnosis and diagnosis by exclusion method.
- ⇨ Importance of case taking: frequently affords a lead in the right direction or clue to the diagnosis; rules out certain diagnostic possibilities; suggests further avenues of investigation; to focus the observer's attention to the system or systems afflicted; symptoms usually precede signs – history gives early information than physical examination.
- ⇨ While performing physical examination, we should give more stress on maximizing the patient's comfort, avoiding unnecessary changes in the position and enhancing the clinical efficiency.
- ⇨ Day light is best preferred when compared to artificial light which may mask the skin colour in the assessment of jaundice of the patient.
- ⇨ Different doctors are having the different routines of physical examination. One should develop a routine of examination which combines speed with thoroughness, sensitivity and alertness and which do not disturb the patient unnecessary.

Probable questions may be asked in the examination

MCQs

1. **If 45 years old male patient presents with dysphagia. Then probable anatomical diagnosis is**
   - a. Respiratory disease;
   - b. Cardiovascular disease;
   - c. Alimentary canal disease;
   - d. Musculoskeletal disease

   Answer -(c)
2. **If 50 years old male patient presented with progressive weight loss from a period of 2 months. The most probable pathological diagnosis could be**
   - a. Infective disease;
   - b. Neoplastic disease;
   - c. Traumatic disease;
   - d. Congenital disease

   Answer -(b)
3. **Which of the following is not a symptom?**
   - a. Headache;
   - b. Yellowish discolouration of eyes;
   - c. Abdominal pain;
   - d. Tenderness in epigastrium

   Answer -(d)
4. **Find the one which does not belong to a group.**
   - a. Vomiting;
   - b. Loss of appetite;
   - c. Hemetemesis;
   - d. Hemoptysis

   Answer -(d)
5. **The minimum reading present in routine sphygmomanometer is**
   - a. 10 mmHg;
   - b. 0 mmHg;
   - c. 80 mmHg;
   - d. 60 mmHg

   Answer -(b)
6. **Normal temperature of human [illegible]ngs in healthy condition is**
   - a. 96°F;
   - b. 99°F;
   - c. 98.6°F;
   - d. 97.2°F

   Answer -(c)
7. **Intermittent fever which occurs daily is coined as**
   - a. Tertian fever;
   - b. Quartan fever;
   - c. Remittent fever;
   - d. Quotidian fever

   Answer -(d)
8. **The term tachycardia refers to**
   - a. Increased heart rate;
   - b. Increased pulse rate;
   - c. Both 1 and 2;
   - d. None of the above

   Answer -(c)
9. **Normal respiratory rate in healthy adult individual is**
   - a. 2 – 3/ minute;
   - b. 16-20/ minute;
   - c. 30-40/ minute;
   - d. 10-12/ minute

   Answer -(b)
10. **Body mass index (BMI) is being calculated as**
    - a. w/h2;
    - b. h/w2;
    - c. w2/h;
    - d. h2/w

    Answer -(a)
11. **Arcus senilis is the sign seen in which part of the body?**

a. Skin;
b. Tongue;
c. Nose;
d. Eyes

Answer -(d)

12. **Swan neck deformity is seen in which of the following conditions?**
a. Rheumatic fever;
b. Rheumatoid arthritis;
c. Osteoarthritis;
d. Gout

Answer -(b)

13. **Swan neck deformity is seen in which of the following body parts?**
a. Neck;
b. Hands;
c. Abdomen;
d. Head

Answer -(b)

14. **Which of the following signs are not seen in the patients of gout?**
a. Z deformity;
b. Swan neck deformity;
c. Button hole deformity;
d. Tophi

Answer -(d)

15. **When do you say one person is undernourished?**
a. BMI < 20;
b. BMI < 18;
c. BMI <25;
d. BMI <30

Answer -(b)

16. **The term bradycardia is used when the heart/ pulse rate is**
a. < 40 beats/ minute;
b. 20 beats/ minute;
c. 60 beats/ minute;
d. 100 beats/ minute

Answer -(c)

17. **Which of the following symptom indicates the cerebellar lesion?**
a. Ataxia;
b. Analgesia;
c. Retention of urine;
d. Coma

Answer -(a)

18. **Which of the following indicates the 8th cranial nerve dysfunction?**
a. Vertigo;
b. Deafness;
c. Tinnitus;
d. All of the above e. None of the above

Answer -(d)

19. **In which of the following clinical conditions, history taking is very important than physical examination?**
a. Ischemic heart disease;
b. Epilepsy;
c. Psychiatric illness;
d. All of the above

Answer -(d)

20. **1. Higher mental function, 2. Cranial nerve examination, 3. Speech, 4. Sensory system examination, 5. Motor system examination. Write these neurological examination methods in the order of preference.**
a. 12345;
b. 13254;
c. 54321;
d. 15243

Answer -(b)

***

Respiratory System

10

Approach to the patient of respiratory disease

- ⇨ Patients with respiratory diseases come to the hospital with either presenting complaints, abnormality on the chest radiograph or both.
- ⇨ Differential diagnosis is based on careful history, necessary physical examination, pulmonary function testing, additional imaging studies and bronchoscopic examination.
- ⇨ As far as case history related to respiratory disease is concerned, history of allergy, history of smoking, history of occupational exposure, history of environmental exposure, history of pulmonary tuberculosis, history of chest trauma, history of surgery of the chest and family history of bronchial asthma, tuberculosis and history of high risk behaviours such as male homosexuality or intravenous drug administration etc are much important.
- ⇨ Respiratory diseases can be categorised into two types – namely,
  a. Upper respiratory system diseases
  b. Lower respiratory system diseases. Another way of categorisation of the diseases of respiratory system fall into one of the three major categories: 1. Obstructive lung diseases; 2. Restrictive diseases and 3. Abnormalities of pulmonary vasculature.
- ⇨ Obstructive lung diseases are most common and primarily include disorders of the airways such as bronchial asthma, chronic obstructive pulmonary disease, bronchiectasis and bronchiolitis
- ⇨ Diseases resulting in restrictive pathophysiology include parenchymal lung diseases, abnormalities of chest wall and pleura as well as neuromuscular disease.
- ⇨ Disorders of pulmonary vasculature are not always recognised and include pulmonary embolism, pulmonary hypertension and pulmonary venoocclusive disease.
- ⇨ Many diseases fall into these categories, both infective and neoplastic processes can affect respiratory passageways and may result in various pathological findings including obstruction, restriction and pulmonary vascular disease.
- ⇨ Sooner or later, right side of the heart will be afflicted when the person is suffering from chronic respiratory disease. This is termed as cor pulmonale.

Presenting complaints of respiratory disease: can be categorised into two sub headings:

a. Upper respiratory symptoms
b. Lower respiratory symptoms

a. **Upper respiratory symptoms include:** nasal blockage, running nose, heaviness of head, dry cough, sneezing, pain in the ears, post nasal drip and hoarseness of voice. Among these symptoms, nasal blockage will confirm the presence of crust in the nasal cavity, the presence of running nose will help in the progression of the illness in the nasal cavity, complaints of dry cough and sneezing will be suggestive of early respiratory disease, blockage of the Eustachian tube can be predicted by pain in the ears, post nasal drip will help us to make the diagnosis of progression of the pathological process from upper to lower respiratory passages and diagnosis of laryngeal disease can be made by observing the presenting complaint of hoarseness of voice.

b. **Lower respiratory symptoms include:** cough, sputum production, breathlessness, chest discomfort and haemoptysis

Cough:

Cough is sudden reflex by forceful expiration and expulsion of irritant material and secretions from the upper or lower respiratory tract. A patient must be asked for onset of cough i.e. sudden[1] or gradual[2] and duration of suffering. Ask if the person is having dry cough[3] or productive cough. Note for the paroxysms of cough[4] and number of bouts of cough. Identify the nature of cough[5]. Identify the character of sputum. Know about the aggravating[6] and relieving factors of cough. Dust, fumes, climate, cold or freezed food may deteriorate the episodes of cough. Examine for fever[7] and other associated symptoms. Cough may be either painful[8] or painless.

Sputum:

The secretions of respiratory disease comes after coughing is termed as expectoration. These are nothing but the secretions of the trachea, bronchi and lungs which comes through mouth. Sputum[9] may be little or copious in quantity[10]; have increased secretion during change of posture[11].

- **Breathlessness:** Awareness of one's own breathing distress or experience of discomfort in breathing. As far as breathlessness[12] is concerned, it may be possible in case of respiratory disease, cardiac disease, obesity.

- **Chest discomfort:** is observed in respiratory disease, cardiac disease, alimentary canal disease, Musculo skeletal disease and neurological disease. In case of respiratory disease, the person will be having pain on either sides of the chest. In case of cardiac disease, the person will be having retrosternal discomfort radiating to the left shoulder or fingers, worsening on exertion and getting relieved by either taking medication or by rest within minutes. In case of alimentary canal disease, the person will be having retrosternal pain has a relation with food intake. In case of Musculo skeletal disease, there will be worsening of pain on change of posture. And in case of neurological disease, the chest pain will be dermatomal in nature and usually will not cross midline.

Haemoptysis[13]:

The term haemoptysis refers to the expectoration of blood. This indicates the serious respiratory and cardiac disease and bleeding diatheses. It is necessary to distinguish the blood is whether the blood is coming from the lower respiratory tract or nasal cavity or alimentary canal or from the oral cavity. When the person is suffering from haemoptysis due to lower respiratory tract disease, it will be associated with the presence of froth in the sputum. In case of bleeding from alimentary canal, it will be either having coffee ground appearance or it will be having remnants of indigested food. In case of bleeding from nasal cavity, there will be association of epistaxis and in case of bleeding from oral cavity, fresh in colour and we can identify the site of the bleeding.

Anatomical areas of the chest

Important landmarks: The significance of natural and artificial landmarks will be helpful in localising the structures of the chest where pathological process occurs.

- **Natural landmarks:** sternal angle, vertebra prominens (spinous process of 7th cervical vertebra), scapula, clavicles, ribs and intercostal spaces, thoracic vertebra

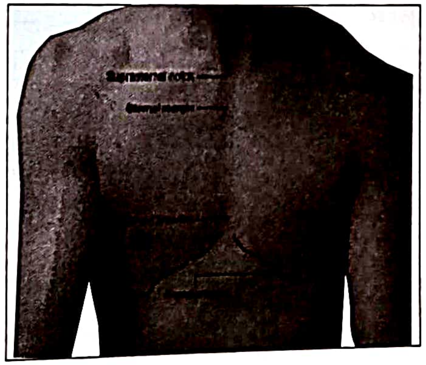

Fig 10.1: Natural landmarks of the thorax

- **Artificial landmarks:** midsternal lines, lateral sternal lines, midclavicular line, anterior axillary lines, midaxillary lines,

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GK

[1] Sudden onset may be seen in acute pulmonary oedema, pulmonary infarction, pneumothorax and acute aspiration of abdominal content from stomach to respiratory passages

[2] Gradual onset of 2-3 weeks can be seen in URTI (upper respiratory tract infection), acute bronchitis, pneumonia, pneumothorax, pulmonary embolism or pulmonary oedema.
Gradual onset of weeks to months can be seen in pulmonary tuberculosis, bronchogenic carcinoma, interstitial lung disease.
Gradual onset of months to years can be seen in COPD, bronchial asthma, bronchiectasis

[3] Presence of dry cough indicates the early pathological changes happening in one's respiratory tract. Whereas productive sputum indicates the long standing inflammatory or infective pathology in the respiratory system

[4] If the person is presented with short paroxysmal cough indicates the involvement of pleura in the illness

[5] Sound of cough may be brassy or metallic or can occasionally harsh and barking type in conditions like tracheitis, bronchitis, mediastinal mass, mediastinal tumour, aortic aneurysm compressing trachea.
Bovine – in this type, non explosive nature, low pitch associated with hoarseness of voice, less effective in clearing secretions, seen in vocal cord paralysis.
Whooping – severe, prolonged associated with whoop sound due to inspired air entering through narrow epiglottis. It is seen in pertussis.
Dry – early stages of viral infection, interstitial lung disease, radiation injury to lungs, lung tumour and inhalation of irritant gas

[6] Dust, smoke and exposure to cold environment if worsens the situation of respiratory disease, then it usually confirmatory of bronchial asthma.

[7] The presence of fever associated with lethargy, bodyache etc implies the infectious process happening inside the body.

[8] Involvement of pleura in case of respiratory disease is associated with pain during breathing. Whereas the respiratory disease is usually not associated with pain.

[9] Character of sputum may be watery, mucoid, purulent sputum. As far as colour of the sputum is concerned, yellowish, greenish, reddish, rusty sputum.
Watery sputum
Mucoid sputum – sticky, colourless or white as seen in chronic bronchitis, bronchial asthma
Serous – colourless, watery, sometimes frothy seen in left heart failure, bronchoalveolar carcinoma
Purulent – pus mixed, observed in lung abscess
Yellowish sputum – indicates the infectious pathology occurring inside the body such as streptococcal, staphylococcal infection
Greenish – allergic respiratory disease where oesinophils are seen in the sputum as in tropical oesinophilia
Rusty colour is seen in pneumococcal pneumonia
Reddish – observed in pulmonary tuberculosis, pulmonary embolism

GK

[10] Little quantity of sputum may indicate early respiratory disease, copious amount of sputum may suggest chronic respiratory disease.

[11] Worsening of cough on change of posture indicates two possibilities – chronic bronchitis and bronchiectasis.

[12] Breathlessness related to respiratory disease is usually associated with the act of breathing. For example, the person suffering from any disease related to upper respiratory tract will have disturbance during inspiration and disease of lower respiratory tract will have disturbance during expiration.

[13] Respiratory disease: Bronchiectasis, bronchogenic carcinoma, acute bronchitis, presence of foreign body in the respiratory airways, tuberculosis, pulmonary embolism,
Cardiac disease: Congestive cardiac failure with left sided heart failure, aortic aneurysm
Bleeding diatheses: leukemia, hemophilia, purpura etc

posterior axillary lines, scapular lines and midspinal line are the artificial lines which will help in dividing the areas of thorax into supraclavicular space, infraclavicular space, supramammary space, inframammary space, axillary space, and infra axillary space, suprascapular, scapular and infrascapular space and interscapular spaces.

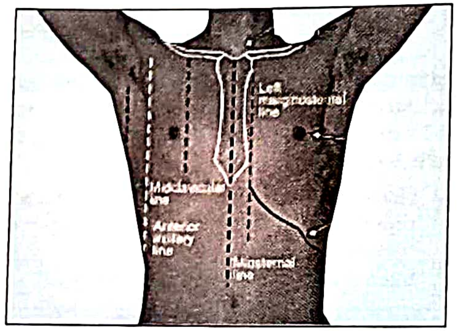

Fig 10.2: Artificial landmarks of the thorax

- ⇨ **Ludwing's angle (sternal angle):** first of all, identify suprasternal notch by finger. Then pull the finger 5 cm below the suprasternal notch, we get a transverse elevation and this is sternal angle.
- ⇨ **Significance of sternal angle:**
  - ❑ Easy to count the ribs and intercostal spaces (ICS). That means the rib present at the level of sternal angle is second rib and the ICS present below the second rib is 2nd ICS.
  - ❑ Ascending aorta will be continuing as arch of aorta at this level.
  - ❑ Arch of aorta will continue as descending aorta at this level.
  - ❑ Upper level anteriorly at which the lungs meet
  - ❑ Upper level of the atria of the heart
- ⇨ **General examination:** This is performed prior to the commencement of systemic examination related to respiratory organs. This information will help the clinician to arrive at a particular diagnosis.

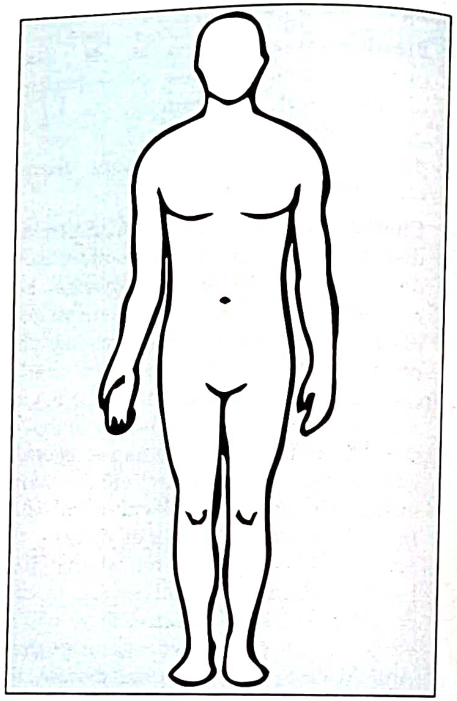

Fig 10.3: The signs in the image of human body

- ❑ **General assessment:** breathing pattern, pattern of movement of alae nasi and sternocleidomastoid muscles, mouth etc will be helpful in diagnosing the respiratory disease which may indicate serious respiratory disease
- ❑ **Hands:** Clubbing is the finding specifically found in respiratory disease, chronic obstructive pulmonary disease in particular.
- ❑ **JVP–** visible jugular venous pulsations in the right side of the neck suggestive of involvement of right side of the heart secondary to respiratory disease.
- ❑ **Peripheral oedema–** bilateral pedal oedema in the evening time suggestive of heart disease owing to the chronic respiratory disease
- ❑ **Lymph node assessment–** enlargement of lymph node in the left supraclavicular region suggestive of malignancy or chronic infection of the respiratory system

- ⇨ **Systemic examination:** systemic examination of respiratory disease is performed in the following methods. Before, performing systemic examination, the following factors should be analysed.
- ⇨ **Mouth:** Any swelling at the back of the mouth that cause sleep apnoea syndrome
- ⇨ Swelling of the lips, tongue and other tissues are seen in angioedema (associated with difficulty in breathing and stridor)
- ⇨ Check nasal patency ask the patient to breathe through one nostril closing other nostril.
- ⇨ Check for the patency of Eustachian tube by performing Valsalva manoeuvre i.e. closing both the nostrils and mouth, ask the patient to expire forcefully. This mechanism will lead to the gush of air into the Eustachian tube where in the person will feel the entry of the air into the ears. If there is no blockage, the person will feel the movement of air into the ears and if there is blockage in the Eustachian tube, the person will not have the movement of air into the ear on the side of the blockage of Eustachian tube.
- ⇨ Examine nose for any increased mucus, enlarged turbinate.
- ⇨ Examine throat for congestion and swelling of the tonsil.

Pre requesites of systemic examination of chest

- ⇨ The patient should be in sitting posture, preferably or in standing posture or in lying down posture.
- ⇨ The exposure of the patient should be upto waist region and examined in good light. The light should be adequate and should fall on both sides of chest equally.
- ⇨ Examination should be done in front of the chest first, later side of the chest and at last back of the chest should be examined. While performing examination of front of the chest, front part of the chest should be exposed till the waist and while doing the examination of the back, front part of the chest should be covered.
- ⇨ If the patient is in recumbent posture, inspection of the chest is carried first from the lower end of the bed and later from side of the patient preferably right side of the patient. Afterwards, the patient has to sit and later examination of the back should be performed. If the person is having any major respiratory distress, patient has to turn to one side, so that the back of the patient can be examined.

Inspection:

Scheme of examination of chest during inspection

- ⇨ Size, shape and type of chest
- ⇨ Presence of asymmetry or deformity of chest
- ⇨ Respiratory movements, rate, rhythm and type of respiration, abnormalities of respiratory movements on one side or both sides, intercostal retraction, movement of subcostal angle and action of accessory respiratory muscles
- ⇨ Position of apical thrust
- ⇨ **Additional observations –** enlarged lymph nodes, visible pulsations, sternomastoid sign, oedema, scars and local masses on chest wall
- ⇨ Size, shape and type of chest: the shape of a normal, healthy adult chest is elliptical shaped, bilaterally symmetrical with a proportion of antero-posterior to transverse diameter of 5:7 ratio. The vertical diameter exceeds both antero-posterior and transverse diameter. In case of early childhood and in elderly people, the shape of chest is circular with equal antero-posterior and transverse diameters.

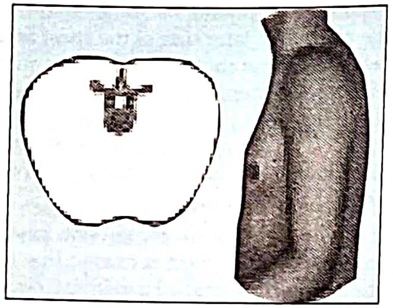

Fig 10.4: Bilaterally symmetrical chest

⇨ **Abnormal chests:**

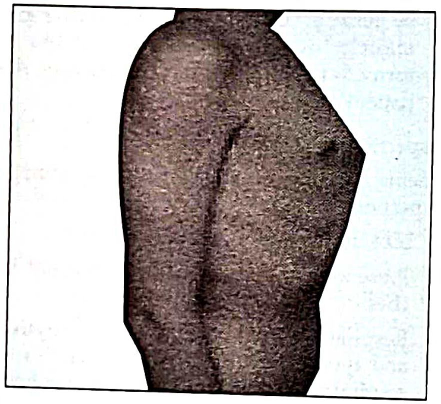

Fig 10.5: Pigeon chest

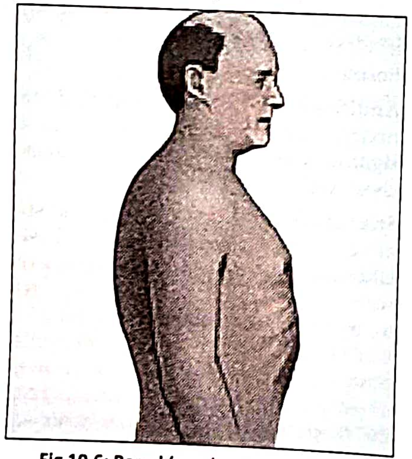

Fig 10.6: Barrel (emphysematous) chest

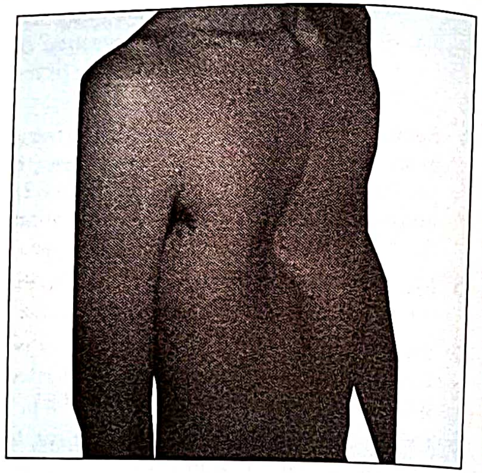

Fig 10.7: Cobbler's chest (funnel chest or pectus excavatum)

Asymmetry of chest: This may occur due to deformity of spine, unilateral bulging or unilateral retraction or local bulging.

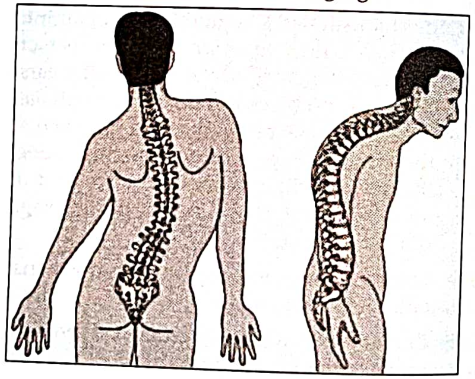

Fig 10.8: In kyphosis and scoliosis, asymmetry of the chest is noted

- ❑ In the person, suffering from aortic aneurysm abnormal swelling in the retrosternal region is noted.
- ❑ In collapse of the lung, retraction of the side of the lung collapse is noted.

⇨ **Respiratory movements:**

- ❑ Normal respiration: In healthy people, rate of respiration in adults is 18-22/ minute. It is somewhat higher in females and 40/ minute at the time of birth. The rate of respiration may vary even in health due to exercise, emotion or excitement and during sleep.
- ❑ Rhythm of respiration is usually regular. This may be disturbed in the patients suffer from meningitis, coma, shock or preterminal event in moribund patients.
- ❑ Prolongation of respiratory phase: Inspiratory or expiratory phases or both phases may be observed in several conditions. When the person is presented with diseases of upper respiratory passages, he will have prolonged inspiratory phase of respiration. In the patients suffering from lower respiratory diseases, the individual may present with prolonged expiratory phase of respiration. In the patients of acute alcoholism, narcotic poisoning, diabetic coma, uremia and in cerebral tumours, prolonged inspiratory and expiratory phases are observed.
- ❑ **Pursed lip breathing:** when the person is presented with severe, chronic airways obstruction, the individual will exhale through his mouth with pursed lips.

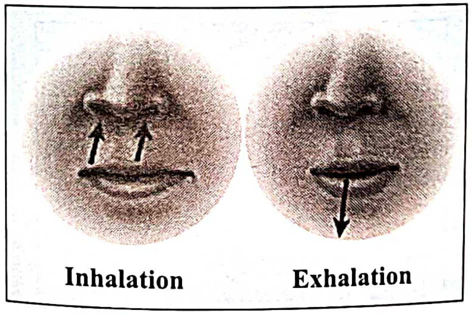

Fig 10.9: Pursed lip breathing

- ❑ Respiration pulse ratio: Normal respiration pulse ratio is 1:4. This will be altered in case of pneumonia and in congenital heart disease or congestive cardiac failure this may be altered in the ratio of 1:2 or 1:3. In case of opioid poisoning, the ratio may be 1:5 or 1:6.
- ❑ **Abnormal type of breathing:** in the male, who is suffering from any abdominal disease, he may be having either thoracic or thoraco abdominal breathing. In case of females suffering from any respiratory disease, she may be having either abdominal or abdominothoracic breathing.
- ❑ **Indrawing of intercostal spaces:** Mild degree of indrawing of intercostal space is normal. When the individual is suffering from either tracheal obstruction or hyperinflation of chest in case of emphysema, the degree of indrawing of intercostal spaces is more. In case of collapse of the lung, higher degree of indrawing of intercostal spaces is seen on the side of the collapse of the lung.
- ❑ **When the person is suffering from severe, chronic respiratory disease,** the person will show the signs of action of accessory respiratory muscles such as movement of alae nasi, sternocleidomastoid and intercostal muscles.

⇨ **Trail's sign:** (sternomastoid sign) tracheal shift to one side results in prominence of sternocleidomastoid on that side

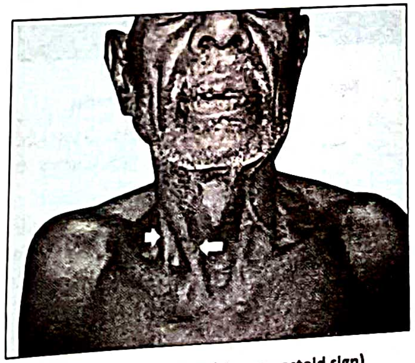

Fig 10.10: Trail's sign (sternomastoid sign)

⇨ **Position of apical thrust:** in healthy adults, the position of visible apex thrust will be in left 5th intercostal space within the left midclavicular line. This may be altered in case of mediastinal shift. In case of collapse of the lung or fibrosis of the lung, the apex thrust is pulled towards the side of the lesion and in case of pleural effusion or emphysema or pneumothorax, the apex thrust is pushed away from the side of the lesion.

⇨ **Other observations:**

- ❑ **Enlarged lymph nodes:** visible enlargement of lymph nodes in the neck, axilla or supraclavicular region should be carefully noted. Enlargement of the lymph node can be seen in case of malignancy of the organs of the chest or in case of tuberculosis or other chronic infections.
- ❑ **Enlarged and visible veins** in the chest wall may indicate the superior vena caval obstruction.

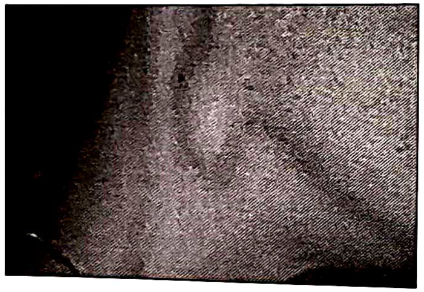

Fig 10.11: Enlarged visible lymph nodes

- ❑ Visible linear scars in the chest wall may indicate the previous history of surgery of the chest region.
- ❑ Abnormality of the breast should be noted such as retracted nipple, discharge from the nipple, peau de orange pattern of skin around breast, retraction of part of the breast etc should be noted

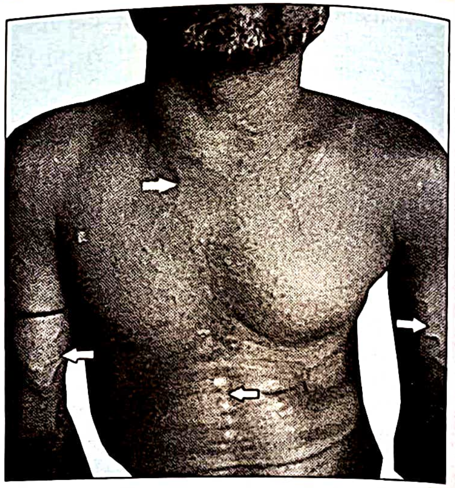

Fig 10.12: Visible veins in the chest

Palpation: Scheme of examination in palpation of chest

- ⇨ Respiratory movements
- ⇨ Position of mediastinum
- ⇨ Expansion of the chest
- ⇨ Tenderness of the chest wall, costochondral junction
- ⇨ Tactile vocal fremitus
- ⇨ Examination of localised swelling, lymph node observed in the neck, axilla and supraclavicular region

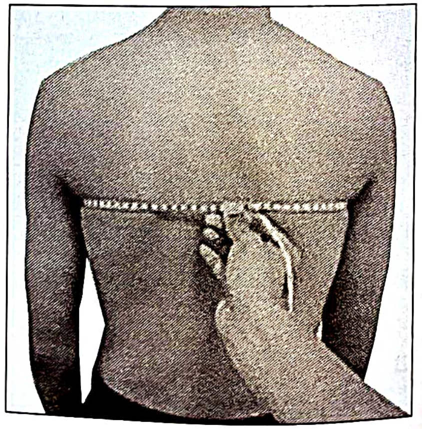

Fig 10.13: Expansion of the chest

⇨ This can be explored by palpation. For examining this, a physician should face the patient and place finger tip of both hand on lower ribcage. Ask the patient to take deep breath, this causes expansion of chest felt in fingers of the physician.

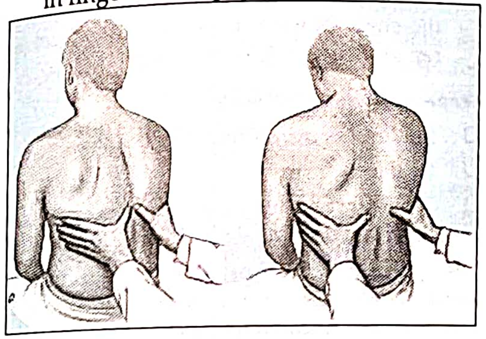

Fig 10.14: Movement of the chest

⇨ Compare the equality in both lung surfaces

⇨ Any indrawing of suprasternal and supraclavicular fossae, intercostal spaces and epigastrium with inspiration and during exhalation contraction of abdominal muscles and latissimus dorsi (not needed normally as elastic recoil of lung is adequate for expiration) indicates respiratory distress.

⇨ **Respiratory movements:** Palpate different areas of the chest.

- ❑ **Infraclavicular area movement:** Ask the patient to sit/ lie in the supine position. Let the patient to breathe steadily. Physician has to look tangentially at infraclavicular area at both sides of the chest to see any difference in the movement of any one or both sides of the chest to see any difference in movement and also keep two hands over infraclavicular area and make out movement.

Mammary and lower part of the chest: Sides of the chest grasped with fingers to approximate tips of outstretched thumbs in the regions of

- ❑ Mammary area
- ❑ Xiphoid process (for lower end of the chest)
- ❑ Loose fold of skin in between two thumbs is produced by adjustment of hands and with each chest expansion hands move apart. Look for degree of movement on two sides of the chest estimated by relative movement of two thumbs with each inspiration.

⇨ **Posterior movement:**

- ❑ Chest grasped from behind in the region of lower thoracic spine (T10)

⇨ Degree of movement of two thumbs noted on either side.

Litten's sign

- ❑ Sign for observing movement of diaphragm
- ❑ Ask the patient to stay in supine position with lower part of chestwall exposed to light. Look for movement of diaphragm which is made out as a wave form (phrenic wave) moving up and down in lower part of the chest with each inspiration.
- ❑ Unilateral absence of movement indicates unilateral phrenic nerve paralysis.
- ❑ Bilateral absence of movement indicates bilateral diaphragm paralysis associated with thoraco abdominal disco-ordination of respiratory movement.

Position of mediastinum

⇨ **Trachea** – normally situated in midline/ slightly deviated to the right 1 – 2 mm; and above supra sternal notch is 4 – 5 cm length.

- ❑ **Method of examination:** Keep middle finger on sternal notch; put index finger on one side and ring finger on other side and assess deviation. This will help in diagnosis of the shift of upper mediastinum

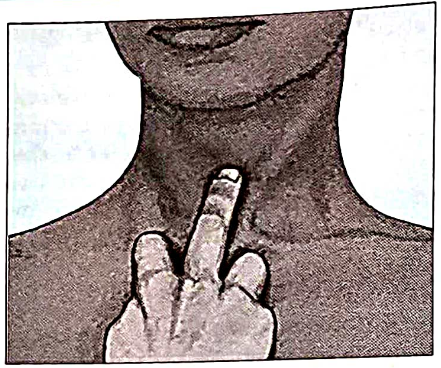

Fig 10.15: Examination for position of trachea

⇨ **Apex impulse:** locate the apex impulse with palm and fingers and determine whether it is within midclavicular line or being shifted abnormally lateral side away from the left midclavicular line and towards the left sternal border. If the apex impulse is shifted lateral to left midclavicular line, then we can predict the right pleural effusion or left collapse of the lung. If the apex impulse is shifted medially towards left sternal border, then we can predict the diagnosis of left pleural effusion or right collapse of the lung. Thus, apex impulse deviation will help in the diagnosis of the lower mediastinal shift.

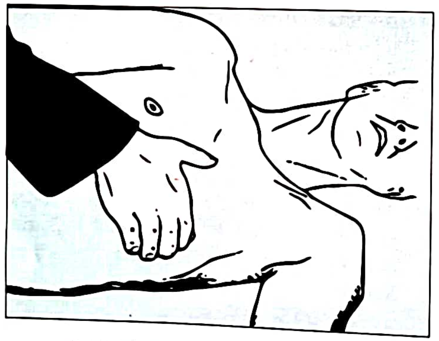

Fig 10.16: Examination of apex impulse

Chest wall expansion

❑ Measurement: place measuring tape around chest at lower part of chest (xiphoid process) record maximum difference during inspiratory and expiratory phase of respiration and it indicates expansion of the chest. Normal expansion of the chest ranges between 2.5 cm – 5 cm.

Tenderness over chest wall:

❑ Tenderness over intercostal muscles[14]

❑ Tender over ribs[15]

❑ Others: bruise over chest, inflammation of skin or breast, myalgia or herpes zoster

Vocal fremitus[16] **(TVF or** tactile vocal fremitus): tactile perception of vibrations produced in larynx communicated to the chest wall through the lungs and tracheobronchial tree (low frequency vibrations).

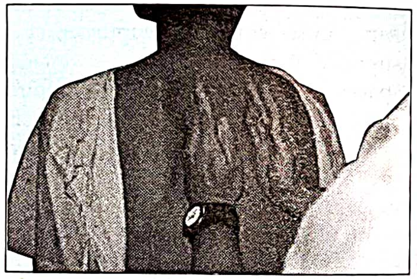

Fig 10.17: Tactile vocal fremitus using both hands of the examiner

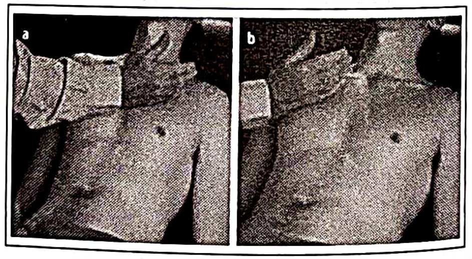

Fig 10.18: Tactile vocal fremitus (TVF) using single hand of the examiner

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[14] Tenderness in this region is seen in acute pleurisy, empyema, chostochondritis

[15] Tenderness over ribs is seen in rib fracture, malignant deposit, osteomyelitis, chronic cough

[16] Fremitus is decreased or absent when the voice is higher pitched or soft or when the transmission of vibration from the larynx to the surface of the chest wall is blocked by a thick chest wall, an obstructed bronchus, COPD or pleural effusion or infiltrating tumour.

❑ To do this skill, one has the ulnar border of the hand on identical areas of both sides of the chest,

❑ Ask the patient to repeat 'one-one-one' or 'nine-nine-nine' or any other simple word in same tone.

❑ Compare the two sides of the chest for the intensity of vibrations felt by the hand. Check top, middle and lower zones anteriorly and posteriorly.

❑ It can be more intense in the right second intercostal space, as well as in the interscapular region, as these areas are closest to the bronchial bifurication.

Examination of localised swelling, lymph node in the neck, axilla and supraclavicular region

⇨ Any bulge, swelling or prominence of the chest must be noted regarding the size, shape, tenderness, redness, pulsation, hardness of the swelling should be noted.

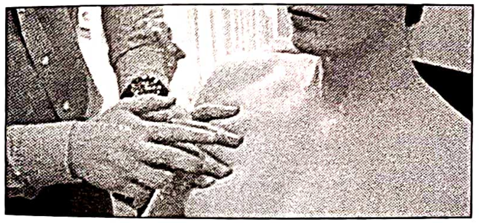


Fig 10.19: Percussion of the patient

⇨ Middle finger of the left hand of the physician is termed as pleximeter finger. It is placed firmly on the part of the body to be percussed. The greater the thickness of the chest, the greater must be the pressure with which pleximeter finger is kept on the surface of the body to be percussed. Make sure that only the pleximeter finger is touching the surface of the body to be percussed and rest of the fingers should be raised and should not touch the body to avoid the dampening of the percussion sounds.

⇨ Pad not the tip of the middle finger of the right hand of the physician is termed as plessor finger. It is used to tap the pleximeter finger. While doing percussion, manicuring of both hands of the physician is must to avoid self injury and injury to the patient's body.

⇨ Strike the pleximeter finger in the middle phalanx or distal interphalangeal joint. Force should come from the wrist not from the shoulder. Striking should be sudden and perpendicular to the pleximeter finger.

⇨ The force of the stroke must vary according to the purpose of the percussion, the tissue or organ being percussed, thickness of the chest wall, the area of the chest wall to be percussed, age, gender and status of the nutrition and individual preference of the examiner. Heavy striking should be avoided.

⇨ Percussion should be done in the intercostal space and avoid percussing the bones. Preferably, the percussion should be comparative percussion. That means after doing the percussion of 1st ICS of right side, he should percuss the 1st ICS of the left side and so on. Start percussion from resonant area to dull area.

Table 10.1: Areas of percussion

Anteriorly	Laterally	Posteriorly
Supraclavicular region	Apex of axilla upto 7th ICS	Chest wall above spine of scapula
Clavicles		Interscapular region
Infraclavicular region – upto 5th ICS		Infrascapular region upto 10th ICS (below the angle of scapula upto 11th rib)

⇨ Percussion of the apex of the lungs[17]: Corresponds to supraclavicular region. Keep middle finger of left hand from behind and percuss with downward movement.

⇨ Percussion of the cardiac borders should

GK

[17] Dullness over the apex of the lungs suggests upper lobar pneumonia, tuberculosis and Pancoast's tumour

be carried out. Obliteration or diminished dull note[18] in cardiac area indicative of pathological process.

- ⇨ Percuss the medial 1/3rd of clavicle. Dull note on the percussion of lateral part of clavicle is suggestive of presence of lateral muscle mass. Abnormal percussion note over clavicle is suggestive of lesion of upper lobe of lungs.
- ⇨ Normal lung percussion – resonant[19], i.e. moderately low pitch and heard easily. Any lesion 5 cm deeper to chest wall or smaller than 2-3 cm diameter does not alter percussion note.
- ⇨ **Tympanic note:** drum like note heard over the hollow viscera. This is seen in case of the presence of superficial cavity in the lung tissue in tuberculosis or in case of pneumothorax.
- ⇨ **Hyperresonant**[20] note is the percussion note intermediate in pitch between normal lung resonance and tympanic note. Normally, this note can be elicited over normal lung tissue by percussion of the chest in full inspiration and holding the breath for sometime. Pathological hyper resonance can be observed in emphysema (bilateral hyperresonance) and in case of pneumothorax and compensatory emphysema (unilateral hyperresonance).
- ⇨ **Normal dullness** – 3rd to 5th ICS anteriorly is cardiac dullness[21]. Dullness in right 5th ICS onwards is liver dullness.
- ⇨ **Dull note shifted** above this region suggests consolidation, pulmonary collapse, raised hemidiaphragm.
- ⇨ **Stony dullness**[22]: this type of note usually heard by doing percussion of thigh muscles.

Auscultation

- ⇨ The position of the patient while doing the auscultation of the lungs, sitting or standing; for examination of the back, patient should lean forwards with head bent forward and arms crossed in front or resting on the thighs. When the person is unable to sit due to illness, examination of the back can be done by turning the patient laterally and doing the examination as specified.

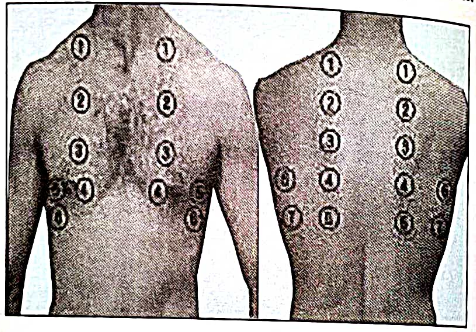


Fig 10.20: Locations of the auscultation of the chest

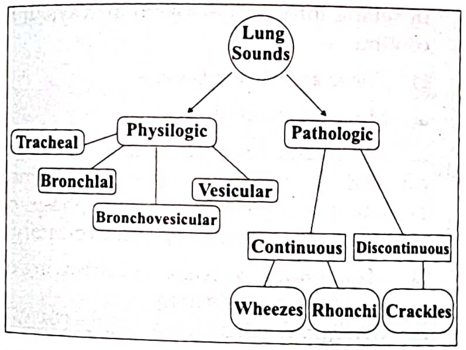
- ⇨ While doing the auscultation, the patient should breathe deeply through open mouth. Quiet breathing is inadequate for the proper assessment of breath sounds and we can avoid the sound coming due to nasal obstruction.

Order of observation

- ⇨ Intensity of breath sounds
- ⇨ Type of breathing
- ⇨ Comparison between inspiratory and expiratory sounds of the breath sounds
- ⇨ Added sounds like rhonchi, crepitation and pleural rub
- ⇨ Voice sounds like vocal resonance, bronchophony, aegophony, whispering pectoriloquey

Table 10.2: Characters of different varieties of breath sounds observed during auscultation

Type of breathing	Duration of sounds	Intensity of expiratory sound	Pitch of the expiratory sound	Location of breath sound
Vesicular[23]	Inspiratory sound > expiratory sound in the proportion of 5:1	Soft	Relatively low	Over most of the lung fields
Bronchial[24]	Expiratory sounds last longer than inspiratory sounds	Louder	Relatively high	Over manubrium
Broncho-vesicular[25]	Inspiratory and expiratory sounds are almost equal	Intermediate	Intermediate	In 1st and 2nd ICS anteriorly and between scapulae
Tracheal[26]	Inspiratory and expiratory sounds are almost equal	Very loud	Relatively high	Over the trachea+



Flowchart 10.1: of normal and abnormal lung sounds

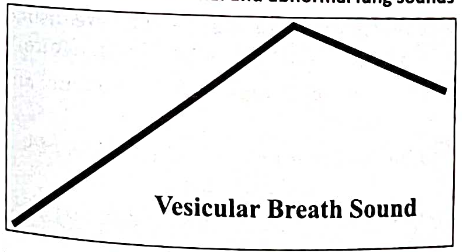


Fig 10.21: Schematic diagram of vesicular breath sound

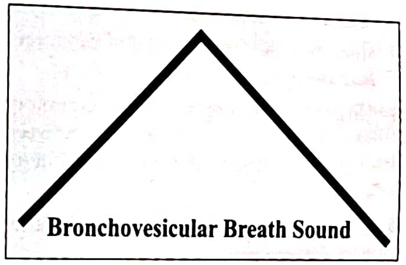


Fig 10.22: Schematic diagram of bronchovesicular breath sound

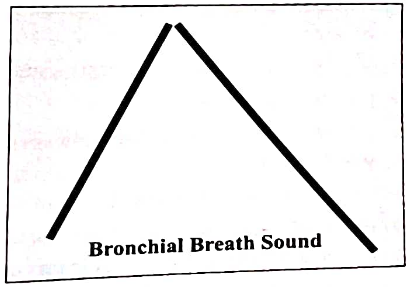


Fig 10.23: Schematic diagram of bronchial breath sound

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[18] Diminished dull note in precordium is indicative of emphysema.

[19] Resonant percussion is due to the lung tissue present below the pleximeter finger which contains normal amount of air in air vesicles, air sacs and air passages. As a rule, the front of the chest yields more resonant note than the back. This is due to lesser bulk of musculature in front than from the back.

[20] Hyper resonant note is suggestive of hyperinflation of the lungs. It is also present in case of pleural effusion, observed particularly at the upper border of the pleural effusion. Unilateral hyperresonance suggests large pneumothorax or a large air filled bulla in the lung.

[21] Loss of dullness in this area is suggestive of hyperinflation i.e. emphysema.

[22] Presence of stony dullness is implying the diagnosis of malignancy of the organ of that region.

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[23] vesicular breath sound

[24] **bronchial breath sound**

[25] bronchovesicular breath sound

[26] tracheal breathing

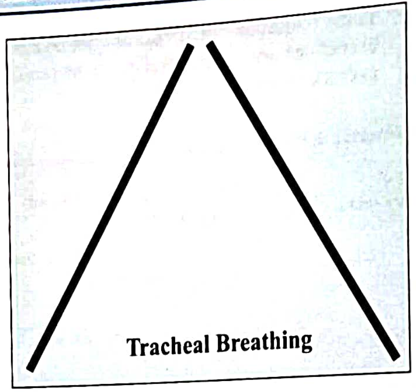

Fig 10.24: Schematic diagram of tracheal breath sound

Vesicular breath sound

- ⇨ Normal sound resembles rustling of leaves of tree. It is soft, low pitched.
- ⇨ Inspiratory sound is 5 times of expiratory sound.
- ⇨ No gap between inspiratory and expiratory sound. There is a huge gap between expiratory sound and next inspiratory sound.
- ⇨ Inspiratory sound is due to gas turbulence in major airways.
- ⇨ Expiratory sound is due to elastic recoil of lung (and produced by central airways and at their bifurications due to convergence of air flow)
- ⇨ Maximum at the onset of expiratory sound
- ⇨ Louder during inspiration.
- ⇨ Expiratory sound has low frequency sound.
- ⇨ Only 1/5th of expiratory sound is heard
- ⇨ Heard all over the chest (lung fields) except over larynx, trachea, upper part of sternum, lower cervical vertebra and 3rd and 4th thoracic vertebra.

Bronchial breath sound

- ⇨ Harsher and blowing type of sound
- ⇨ Inspiratory sound is little shorter than expiratory sound.
- ⇨ There is a small gap present between inspiratory and expiratory sound. There is presence of small gap between expiratory sound and next inspiratory sound even.
- ⇨ This is heard over tracheo-bronchial tree.
- ⇨ This type of sound heard over different lung fields is abnormal.

Added sounds

⇨ **Rhonchi/**[27] **wheeze**[28] – produced as air travelling through narrowed airways. It is continuous.

☐ **These are of two types–**

a. Monophonic and

b. Polyphonic. Further subclassification can be made depending upon the presence of sound in relation to the phase of respiration i.e. inspiratory and expiratory.

☐ **Monophonic wheeze**[29] – narrowing of airway in a single area

☐ **Polyphonic wheeze**[30] – narrowing of airways in multiple areas

⇨ **Crepitations/ crackles**[31] – they are distinct clicking sounds discontinuous in nature.

☐ It is of 3 types. Fine, medium and coarse

a. **Fine** – numerous individual clicks of low amplitude and high pitch.

b. **Medium** – less numerous individual clicks of lower amplitude and lower frequency (medium crackles caused by numerous secretions)

c. **Coarse** – Infrequent individual clicks which are few enough to count during an inspiratory cycle that are individually much louder (higher amplitude) and of low frequency. These are due to secretions moving around in airways. E.g. sputum in airways as patient breathes and sputum moves or bubbles. Large amount of fluid moves relatively slowly thus producing a low pitched sound of considerable volume (amplitude).

☐ **It is of two types –(a)** fixed and **(b)** non fixed.

(a) Fixed crackles – they do not change their pattern during an inspiratory cycle after a period of coughing.

(b) Non fixed – they change the position due to the alteration in amount of sputum

⇨ **Pleural sounds** – this includes pleural rub which is characterised by a leathery or creaking sound produced by movement of visceral pleura over parietal pleura when the surfaces are roughened usually by fibrinous material.

⇨ **Vocal resonance** – it is a voice sound heard with chest piece of the stethoscope.

☐ **Types** –(a) bronchophony, (b) aegophony (a) whispering pectoriloquey

(a) Bronchophony[32] – voice heard near ear piece – which is of greater clarity but individual syllables are unclear.

(b) Aegophony[33] – voice has nasal or bleathing quality (resembling goat). Ask the patient whisper the number '22'. It is high pitched breathing sound transmitted in consolidated lung tissue. If 'ee' sound sounds like 'A', i.e. an E to A change is termed as aegophony. Here A has a nasal bleating quality, and should be localised. In patients with fever and cough, the presence of bronchial breath sounds and aegophony confirms the pneumonia.

(c) Whispering pectoriloquey – ask the patient to whisper at the end of expiration, if the sound is transmitted without distortion so that individual syllables are recognised clearly then it is airless lung.

Chapter Resources

1. Physical diagnosis – a textbook of symptoms and physical signs by Rustam Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
2. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie & Christopher C Evan, 12th Edition, Butterworth Heinmann publications, New Delhi, 1997
3. A manual of clinical surgery by S Das, 4th Edition, Published by Dr S Das, Calcutta, 1998
4. Savill's system of clinical medicine revised & edited by E C Warner, 14th Edition, CBS Publishers, Delhi, 1998
5. The Merck's Manual by Robert S Porter & Justin L Kaplan, 19th Edition, Merck Sharp & Dohme Corp, 2011
6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

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[27] Presence of rhonchi suggest secretion in large airways.

[28] Wheezes implies narrowed airways as in bronchial asthma, COPD or bronchitis.

[29] e.g. large airway obstruction like bronchogenic carcinoma

[30] e.g. COPD, bronchial asthma.

[31] Clearing of crackles or rhonchi after coughing or position change suggests inspissated secretions seen in bronchitis or atelectasis.

[32] Consolidation, cavity communicating with bronchus, above level of pleural effusion

[33] The presence of aegophony confirms the diagnosis of lobar pneumonia.

Key points of the chapter

- ⇨ Patients with respiratory diseases visit to the hospital either with presenting complaints or abnormality on chest radiograph or both. Differential diagnosis is based on careful history, necessary physical examination, pulmonary function testing, imaging studies and bronchoscopic examination.
- ⇨ Respiratory diseases can be categorized into two – upper respiratory diseases and lower respiratory diseases. Any disturbing involving the respiratory passage from nostril to larynx, we can predict the involvement of upper airways involvement and any lesion present in the organ distal to larynx till the end of respiratory system, then we can infer the involvement of lower respiratory passages. In respiratory diseases, sooner or later, there is a possibility of involvement of right side of the heart. This is called cor pulmonale.
- ⇨ As far as the extent of the respiratory system examination is concerned, we need to learn the boundary of respiratory system which comprises two types of landmarks – natural landmarks and artificial landmarks. Natural landmarks are sternal angle, vertebra prominens, scapula, clavicles, ribs and intercostal spaces, thoracic vertebra. Artificial landmarks include midsternal line, lateral sternal lines, midclavicular lines, anterior axillary lines, midaxillary lines, posterior axillary lines, scapular lines and midspinal line. The knowledge of these landmarks helps in localizing the lesion of respiratory tract.
- ⇨ General examination in case of respiratory disease include breathing pattern, pattern of movement of alae nasi and sternocleidomastoid muscles, opening and closure of mouth, clubbing, visible jugular venous pulsations (JVP), peripheral oedema and lymph node assessment.
- ⇨ Systemic examination of respiratory disease include examination of nose, mouth and chest examination. Examination of chest include inspection, palpation, percussion and auscultation.
  - ☐ Inspection include size, shape and type of chest, asymmetry of the chest, respiratory movements, rate, rhythm and type of respiration, abnormalities of movement of chest on one or both sides, intercostal retraction and action of accessory respiratory muscles.
  - ☐ Palpation include respiratory movements, position of mediastinum, expansion of chest, tenderness of the chest wall or costochondral junction, tactile vocal fremitus.
  - ☐ Percussion is done to determine the nature of percussion sounds in chest – resonant (normal heard all over the lung field normally), hyperresonant (observed in the patients of emphysema or pneumothorax and heard normally in the individual who holds the breath after deep inspiration) and dull note observed in pleural effusion.
  - ☐ Auscultation is done to know the type of breath sounds (vesicular, bronchial and bronchovesicular), added sounds (wheezing and rhonchi), vocal resonance.

Probable questions may be asked in the examination

MCQs

1. **Cor pulmonale is the term used when the person is having involvement of right side of the heart due to**
   - a. Left ventricular hypertrophy;
   - b. Left atrial enlargement;
   - c. Chronic bronchial asthma;
   - d. All of the above

   Answer -(c)
2. **Visible JVP indicates which of the following:**
   - a. Cor pulmonale;
   - b. Right atrial enlargement;
   - c. Both 1 and 2;
   - d. None of the above

   Answer -(c)
3. **Trail's sign indicates which of the following?**
   - a. Upper mediastinal shift;
   - b. Lower mediastinal shift;
   - c. Both 1 and 2;
   - d. None of the above

   Answer -(a)
4. **Trail's sign indicates which of the following?**
   - a. Large pleural effusion;
   - b. Collapse of upper lobe of the lung;
   - c. Both 1 and 2;
   - d. None of the above

   Answer -(b)
5. **The presence of inspiratory dyspnoea indicates the site of the lesion in**
   - a. Nose;
   - b. Nasopharynx;
   - c. Larynx;
   - d. All of the above

   Answer -(d)
6. **The presence of large amount of purulent sputum worsens on change of posture indicates the diagnosis of**
   - a. Chronic bronchiectasis;
   - b. Acute bronchitis;
   - c. Vocal cord paralysis;
   - d. Allergic rhinitis

   Answer -(a)
7. **Which of the following is incorrect regarding vesicular breath sound?**
   - a. It is of rustling character;
   - b. Expiratory sound is 1/5th of inspiratory sound;
   - c. There will be no gap between inspiratory and expiratory sound;
   - d. There will be a small gap between inspiratory and expiratory sound

   Answer -(d)
8. **Normally, cavernous breath sound is seen in which part of the body?**
   - a. Either sides of sternal angle;
   - b. Nape of the neck;
   - c. Base of the lung;
   - d. All of the above

   Answer -(b)
9. **Which of the following is termed as pleximeter finger?**
   - a. Right index finger;
   - b. Right middle finger;
   - c. Left middle finger;
   - d. Left index finger

   Answer -(c)
10. **The exact place of strike in pleximeter finger during percussion is**
    - a. Middle phalanx;
    - b. Distal interphalangeal joint;
    - c. Both 1 and 2;
    - d. None of the above

    Answer -(c)

***

Cardio Vascular System

11

Approach to the patient of cardio vascular disease

- ⇨ When the person is suffering from the cardio vascular disease, he may be presented with breathlessness on exertion or chest discomfort or bilateral pedal oedema or syncope. These are the cardinal manifestations of the cardiac disease.
- ⇨ The person may have symptoms which may indicate either left sided or right sided heart dysfunction. Dysfunction related to one sided heart failure will show typical clinical presentation.
- ⇨ As far as pathophysiology of cardiac disease is concerned, four pathophysiologic mechanisms will be possible in the manifestation of the disease as unique pathology or in combination. They are myocardial ischemia, disturbance in the contraction and relaxation of myocardium, obstruction to the blood flow or arrhythmias.
- ⇨ Myocardial dysfunction can be predicted when the person is presented with cardiac symptoms on doing exertion and he will be asymptomatic at rest. Many patients with cardiovascular disease may be asymptomatic both at rest and during exertion, but abnormal physical examination finding such as heart murmur, raised arterial pressure.
- ⇨ The diagnosis of the cardiac disease is done by abnormal lipid profile, electrocardiogram (ECG), cardiac silhouette in chest X ray, echocardiogram, coronary angiogram and assessment of cardiac enzymes.

Diagnosis of cardiac disease:

The following factors will be helpful in the complete evaluation of the patient of cardiac disease.

- ☐ **Underlying aetiology–** congenital, hypertensive, ischemic or inflammatory?
- ☐ **Anatomical abnormalities–** which chambers are involved? Are they hypertrophied, dilated or both? Which valves are afflicted? Are they stenotic or regurgitant? Is there pericardial involvement? Has there been myocardial infarction?
- ☐ **Physiological disturbances–** is an arrhythmia present? Is there evidence of congestive cardiac failure or myocardial ischemia?
- ☐ **Functional disability–** How strenuous is the physical activity required to elicit the symptoms?
- ☐ For example, in patient presented with chest discomfort, merely identifying the ischemia as the cause of chest discomfort is not sufficient to plan the therapeutic strategy. Anatomical abnormalities such as Aortic stenosis (AS), coronary atherosclerosis should be identified and a judgement is made as other physiological disturbances cause imbalance between myocardial oxygen supply and demand – anemia, thyrotoxicosis and supraventricular tachycardia (SVT).
- ☐ Finally, the severity of disability should be given the extent and tempo of the workup and strongly influence the therapeutic strategy that is selected.
- ⇨ The diagnosis of vascular disease can be confirmed by doppler study of the blood vessels.

Presenting complaints of cardio vascular disease

Breathlessness[1]

- ⇨ The term breathlessness refers to the awareness of one's own breathing. In case of cardiac disease, above mentioned are observed in the gradual progression of the illness.
- ☐ **DOE (Dyspnoea or breathlessness) on exertion:** this symptom is observed when the person does some kind of physical exertion such as climbing the stairs or doing the gardening or walking for a long time. Such activities will lead to the extra burden on the cardiac muscles which leads to the tachycardia. It is a known fact that myocardial muscles will receive adequate blood supply only during the diastolic phase of the cardiac activity. Thus, while exertion, diastolic phase of the cardiac function will be reduced and thereby responsible for the reduced blood supply to the heart muscles. The outcome is breathlessness. This is termed as dyspnoea on exertion.
- ☐ **PND (Paroxysmal nocturnal dyspnoea):** the term PND refers to the development of dyspnoea in episodic attacks in night time. When the person goes to bed for sleep, he will develop breathlessness after 30-40 minutes. To get relief from the breathlessness, the patient will sit for about 5-10 minutes. This cycle repeats. This is called as PND. This is mainly observed in the patients having left ventricular dysfunction. Because of this, there will be backflow of the blood in the pulmonary capillaries, thereby transfer of the blood in the alveoli will occur thus, the person will have dyspnoea. When the person sits for a while, this will lead to proper pulmonary circulation. Thus, he will have relief from dyspnoea.
- ☐ **Orthopnoea:** The term orthopnoea refers to the development of breathlessness when he attains the recumbent posture. This will lead to the attainment of the sitting posture with forward bending. In this, mechanism, the person will be having severe form of circulatory dysfunction.

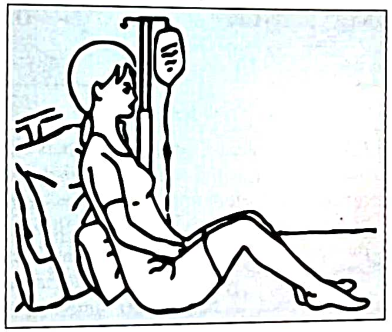

Fig 11.1: Patient of orthopnoea

- ☐ **Cheyne Stokes breathing:** this is considered to be severe form of breathlessness in cardiac disease. Here, the person will be having episodes of deep breathing and absence of breathing.

Chest discomfort

When the person is presented with chest discomfort due to cardiac disease, he will be having retrosternal pain which radiates to the left shoulder or to full left upper limb or to the neck till jaw. Sometimes, the person may also be presented with pain in the epigastric region. The pain usually present for few

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[1] Breathlessness is also being observed in pulmonary disease, obesity, anxiety and cardiac disease. The differentiation of breathlessness is already discussed in the context of respiratory systemic examination. In case of obesity, his BMI (body mass index) will be more than 30 and he will also show exertional dyspnoea and he will have hyperlipidemia. In case of anxiety, the person will be having altered state of consciousness, pursed lip breathing and history of exposure to psychological stress. In case of cardiac disease, breathlessness is graded as DOE, PND, orthopnoea and Cheyne Stokes breathing

minutes and is aggravated by exertion or heavy meals or exposure to cold environment and gets relieved by taking rest or sublingual medications. One should specifically note that if the person is presented with chest discomfort for few seconds, then it is invariably not due to cardiac cause. The differential diagnosis of chest discomfort was discussed elsewhere in the context of respiratory symptom description.

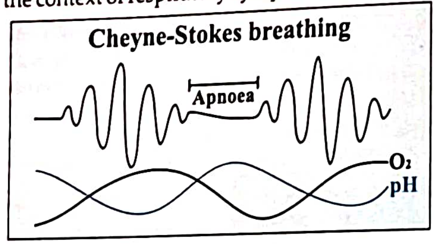

Fig 11.2: Cheyne-Stokes breathing

- ⇨ **Bilateral pedal oedema–** when the person is presented with right sided heart dysfunction, there will be backflow of the blood to inferior vena cava. This will lead to the backflow of the blood in the capillaries of the lower limb thereby oedema will be observed in both lower limbs in the evening time.

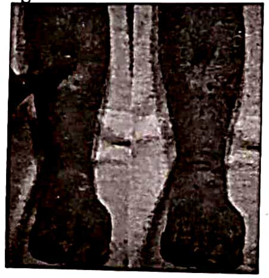

Fig 11.3: Pitting type of oedema in the lower limbs

- ⇨ **Palpitation** – this is specifically observed when the person is having arrhythmia or disturbances related to specialised conduction system (SAN or AVN or purkinje system).
- ⇨ **Cough with pink frothy sputum–** this is seen in the patients who are presented with left sided heart failure either left ventricle or left atrium. This occurs mainly due to the backflow of the blood from the left side of the heart to pulmonary vessels. This leads to the transfer of blood and fluid from pulmonary capillaries to alveoli. This will cause the irritation of the alveoli leading to the manifestation cough with pink and frothy sputum.
- ⇨ **Pain in the right hypochondrium**[2] – this is seen when there is backflow of the blood from the inferior vena cava into the hepatic vein. This will lead to the hepatomegaly and the person will be presented with pain in the right hypochondrium and epigastric region.
- ⇨ **Oliguria and nocturia–** the term oliguria refers to reduced urine formation (< 500 ml in 24 hours) and nocturia refers to increased urine formation in night time. This is mainly due to the imbalance in the renal blood flow in 24 hours. In day time, the person will be having renal hypoperfusion leading to oliguria and in night time, the person will be having renal hyperperfusion leading to the nocturia owing to the redistribution of the fluid portion coming to heart at night time as a consequence of absence of action of gravitational force at night time.
- ⇨ **Syncope**[3] – the term syncope refers to the reduced/ altered consciousness due to reduced blood supply to the brain. This

mechanism happens due to reduced blood supply to the arch of aorta, i.e. forward failure.

- ⇨ **Fatigue–** this is attributable to the fatigue of skeletal muscles. When the person is suffering from the cardiac disease, proper blood supply to the skeletal muscles will be hampered, while doing the exercise in particular. That is the reason, the person may present with fatigue of skeletal muscles while doing the exercise.
- ⇨ **Squatting position–** this will be usually observed in the children suffering from congenital heart disease. When the child attains the squatting position, this will decrease the venous drainage from the lower limb to the heart, thus reducing the burden on the pumping activity of heart and child will get relief from the breathlessness.
- ⇨ **General constitutional symptoms like fever and weight loss–** as usual, any of the infectious disease of any system will be presented with fever and any chronic debilitating illness, the person will be presented with profound weight loss.

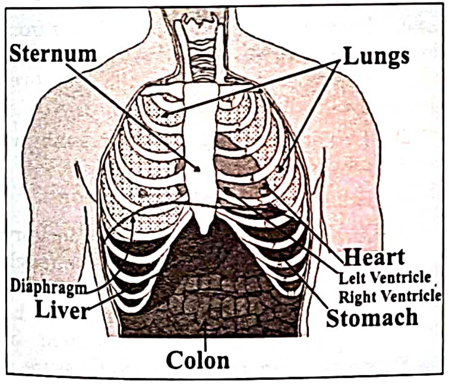

Fig 11.4: Natural landmarks of the thorax in cardiovascular examination

Anatomical areas: Natural and artificial landmarks are helpful in determining the extent of heart. These will be helpful in localising the pathological process occurring in the individuals.

- ⇨ **Natural landmarks:** Sternal angle, ribs and intercostal spaces, manubrium sterni, xiphisternum are the natural landmarks.
- ⇨ **Artificial landmarks:** Midsternal line, lateral sternal line, midclavicular line, anterior axillary line, midaxillary line, posterior axillary line, scapular line and midspinal lines are the artificial landmarks.

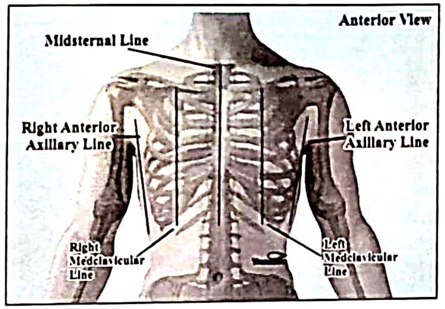

Fig 11.5: Artificial landmarks of the thorax in cardiovascular examination

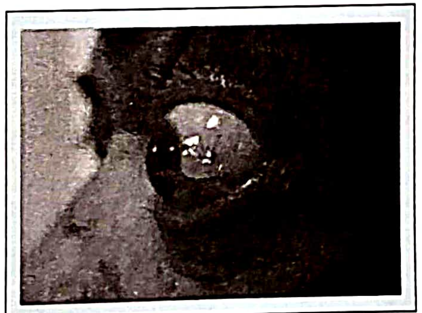

Fig 11.6: Exophthalmos

- ⇨ **Eyes** – exophthalmos observed in the patients of thyrotoxic heart disease; xanthelasma on the eyelids in case of hypercholesterolemia; arcus senilis in elderly people

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[2] Pain in the right hypochondrium and epigastric region can also be seen in the patients suffering from diseases of duodenum, hepatobiliary disease, disease of hepatic flexure. Duodenal disease will be having the pain in the epigastrium after 2 hours of food intake. In case of hepatobiliary disease, the person will be presented with jaundice, yellowish discolouration of skin, mucosa of eyes and tongue, urine or stools, steatorrhoea. In hepatic flexure involvement, the person will be presented with either constipation or diarrhoea along with pain in the right upper quadrant.

[3] This should be differentiated from seizure. In case of seizure, the person will be having loss of bowel and bladder control and transient memory loss. In the case of syncope, bowel and bladder control will be retained. The unconsciousness will be present till the person is attaining the sitting posture. The consciousness will be regained when the person is made to lie in recumbent posture and loosening of clothes of neck was being done.

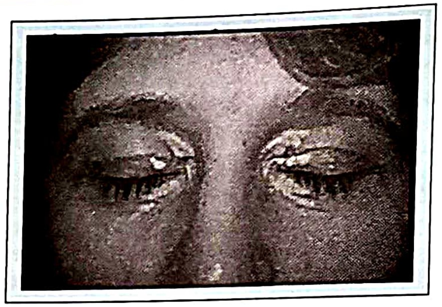

Fig 11.7: Xanthalasma

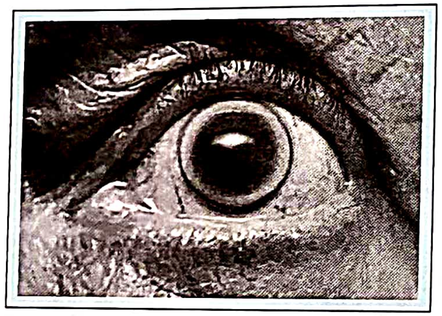

Fig 11.8: Arcus senilis

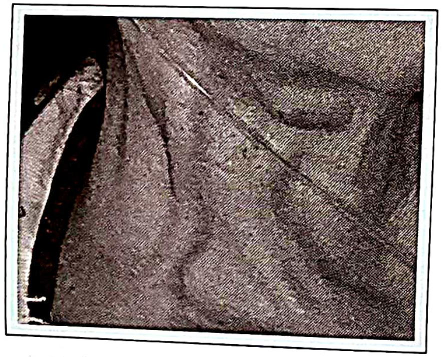

Fig 11.9: Visible jugular venous pulsations

⇨ **Neck** – visible jugular venous pulsations in the patients of right sided heart failure. Normally engorgement of jugular vein may be observed in recumbent position. This is abnormal when JVP is observed above the level of manubrium sterni in sitting or semipropped position 45° from horizontal posture). As a rule, right side of the neck is observed for the assessment of right sided heart dysfunction. JVP is expressed in terms of centimeter for the vertical distance between the top of the column of the blood and sternal angle. For the clinical assessment, the patient should be in propped position with 45° angle with the horizontal position and head in relaxed position.

Hands – examined for the clubbing observed at the distal interphalangeal joint

⇨ **Blood pressure** – two instruments are required for the assessment of blood pressure. They are sphygmomanometer and stethoscope. Sphygmomanometer consists of a manometer, an inflatable bladder with a cuff and inflation-deflation device.

- ❑ Before checking the blood pressure, the patient should be comfortably seated or in recumbent posture and in completely relaxed state. The arm should be free from cloth upto shoulder and supported comfortably with elbow flexed and at the level of heart.
- ❑ The cuff should be tied in the arm with lower level of cuff above 1.5 cms from cubital fossa with tubes of the cuff exactly in front of the cubital fossa over the brachial artery.
- ❑ Two methods of blood pressure are practiced

(a) Palpatory method

(b) Auscultatory method. Palpatory method is used to estimate the rough systolic pressure and auscultatory method of BP assessment will be helpful in accurate assessment of systolic and diastolic blood pressure.

- ❑ After tying the cuff, inflation of the cuff should be done with pump and fingers should be kept over the radial artery,
- ❑ Cuff is inflated 10 mm above the point of stoppage of radial pulsation.
- ❑ Slowly, cuff is deflated and later note the point of appearance of pulsation in the radial artery. This is the point of systolic pressure.
- ❑ Diaphragm of stethoscope is placed over the brachial artery and more pressure is applied over the point of systolic pressure. Then slowly deflation of the cuff is done. The **sound**[4] of pulsation of brachial artery is heard. This is point of systolic pressure. Further, deflation of the cuff is done so that there will be a point gradual disappearance of the sound is seen. This is the point of diastolic pressure.

⇨ **Radial pulsation–** is an important part of the examination. This will be helpful in determining condition of the arterial walls, information regarding the state of the heart and peripheral vessels, detection of arrhythmias of the heart. Radial pulse is usually felt at the wrist and over the radial artery. It is situated slightly medial to the styloid process of the radius, on the anterior aspect of the wrist and is best felt with the subject's forearm slightly pronated and flexed wrist. Both the radial pulsations are palpated simultaneously to detect the inequalities of the radial pulsations. Rate, rhythm, force, volume, equality between pulsations, condition of arterial walls, radio-femoral delay and abnormal characters of pulse should be checked.

⇨ **Peripheral arterial pulsations–** are helpful in determining the site of the blockage of the blood vessel.

- ❑ **Brachial pulse–** this is palpated with elbow flexed at the cubital fossa and medial to biceps tendon either with thumb or fingers of the right hand.
- ❑ **Carotid pulse**[5]– carotid artery is the nearest palpable artery to the arch of aorta. It is palpated with thumb (left thumb for palpating right carotid artery) or the finger tips placed at the upper end of thyroid cartilage along the medial border of the sternocleidomastoid muscle.
- ❑ **Femoral pulse–** femoral pulse should be felt with leg slightly abducted and foot is externally rotated and the examining hand pressed firmly into the groin at the midpoint of pubic symphysis and anterior superior iliac spine.
- ❑ **Popliteal pulse–** popliteal pulse can be palpated by putting the patient in the supine position and both the hands of the examiner encircling and supporting the knee from each side.
- ❑ **Posterior tibial pulse–** the artery can be felt in the groove between medial malleolus and Achilles tendon, the fingers of the examiner curving around the ankle
- ❑ **Dorsalis pedis pulse–** the artery can be palpated just lateral to the extensor hallucis tendon, the examiner placing finger tips across the dorsum of the foot.
- ❑ **Superficial temporal pulse–** the artery can be palpated by keeping the fingers in front of tragus of the ear.

Systemic examination

Prerequisites of systemic examination of cardiovascular system

⇨ The exposure of the patient should be upto waist, should be examined under good day light. Sitting or recumbent position of the patient is preferred for the examination.

⇨ The clinician should stand on the right

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[4] The sounds heard on auscultation of the brachial artery during the blood pressure are termed as Korotkoff sounds. The appearance of the Korotkoff sounds is the point of systolic pressure and disappearance of the Korotkoff sound is the point of diastolic pressure.

[5] The sounds heard on auscultation of the brachial artery during the blood pressure are termed as Korotkoff sounds. The appearance of the Korotkoff sounds is the point of systolic pressure and disappearance of the Korotkoff sound is the point of diastolic pressure

side of the patient. In case of recumbent position of the patient, examiner should stand near the foot end of the patient to check the symmetricity of the chest and abnormal swelling of the chest.

Inspection

- ⇨ Size, shape and type of chest
- ⇨ Shape of precordium
- ⇨ Apical thrust
- ⇨ Other pulsations of the precordium
- ⇨ Suprasternal or episternal pulsation

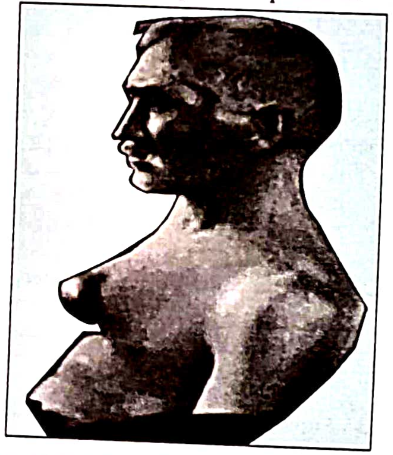

Fig 11.10: Patient of chronic aortic aneurysm

⇨ **Size, shape and type of chest–** This will be dealt with in connection with inspection of respiratory system. The size, shape and type of chest may have a direct bearing on the presence of atypical or abnormal physical signs as in funnel chest, as in scoliosis, straight back syndrome, severe kyphoscoliosis.

⇨ **Shape of precordium–** normally, two sides of the chest are symmetrical. Bulging or retraction of the precordium may be due to diseases outside the heart. E.g. chronic aortic aneurysm.

⇨ **Apical thrust**[6]**–** inspection of the apex thrust is best performed by the clinician in a good day light and tangential inspection of the chest has to be done. The patient will be in either sitting position or recumbent position. Apical thrust is a circumscribed systolic elevation, an outward or forward movement of the chest wall. This is observed in the inferior and lateral part of the chest.

- ☐ Normally, apical thrust[7] is located in left 5th ICS, ½ to 1 cm inside the left medial to left midclavicular line. It is usually 3 – 3.5 inches (7-9 cm) lateral to mid sternal line (distance to be measured not circumferentially but tangentially). The midclavicular line is more simpler and reliable method than mid sternal line. The normal apex impulse[8] is circumscribed to one ICS less than 2.5 cm in diameter or about 1.5 finger width.

⇨ **Other pulsations of the precordium:** This is best appreciated by tangential inspection of the precordial region, preferably with patient in recumbent posture and examiner lowering himself to bring the eyes with the

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[6] In infants or childhood, the apical thrust lies in 4th ICS. In thin chest individuals and in elderly people, the apex thrust is seen in 6th ICS. Obesity, abdominal distension and during pregnancy, apex thrust may be displaced outward and upward.

[7] Apex thrust may be invisible in case of
If the apex thrust is situated behind the rib
Thick chest wall
Pericardial effusion
Pendulous breast
Emphysematous chest

[8] Apex thrust may be shifted in case of diseased condition. For example, shift of the apex thrust towards left lateral side, either right pleural effusion or collapse of left lung is seen. Shift of the apex thrust towards left sternal border, possibility of left pleural effusion and collapse of the right lung is predicted.

level of the chest of the patient.

- ☐ In case of thin chest, hyperdynamic heart, during fever or after exercise, several intercostal spaces show pulsations.
- ☐ In case of right ventricular hypertrophy, pulsation in between 3rd to 6th ICS at left parasternal border is seen.

⇨ **Suprasternal or episternal pulsation–** a pulsation in the suprasternal notch common even in normal individuals. It may also be seen in hyperdynamic heart, anemia, aortic aneurysm, dilatation of aorta.

Palpation: Palpation of the cardiovascular system is of next significance when compared to auscultation of cardiovascular system. While palpation, exposure of the patient upto waist region with sitting or standing and the examiner stands on the right side of the patient.

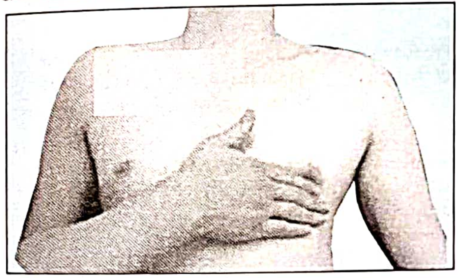

Fig 11.11: Apex beat examination

- ⇨ Pulsations of the abnormal sites
- ⇨ Thrills
- ⇨ Apex beat[9]: apex beat is the palpable pulsation of inferior most and lateral most region of the chest.
  - ☐ First of all, the patient has to be in recumbent posture, exposure is upto waist region.
  - ☐ The examiner should stand on the right side of the patient.
  - ☐ The precordium should be palpated with open hand (palmar palpation) with light and heavy pressure to localise the area of apex beat.
  - ☐ Further localise the apex beat more accurately by tip of index finger or tips of second and third fingers (digital palpation).

⇨ **Pulsations of abnormal sites–** pulsations in neck, abdomen and chest should be tested. Pulsation in the suprasternal notch of neck may be suggestive of hyperdynamic heart or aortic aneurysm. Pulsation in the epigastric region in thin individual may be normal and in case of abdominal aortic aneurysm, pulsation in the epigastric region can be observed. The person suffering from right ventricular hypertrophy, pulsation in the left parasternal border can be palpated.

⇨ **Thrills–** a thrill may be defined as a vibratory sensation or tremor originating from heart or aorta and transmitted to the palpating hand through the chest wall. A thrill can be compared to the sensation experienced by the hand when placed over the throat of the purring cat. This is appreciated by distal palm with light palpation. The person who is suffering from severe structural valvular defects will be having thrills over precordium during palpation.

Percussion: percussion is of little importance in cardiovascular system examination. Yet one can percuss the cardiac border near right sternal border physician can hear the dull sound.

Auscultation: auscultation is the method where stethoscope is used to determine the character of heart sounds.

Auscultatory areas: It is traditional to recognise the four main auscultatory areas over the front wall of the chest. These areas do not correspond to the anatomical situations underlying valves, but represent points at which sounds or murmurs originating in these areas are heard best.

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[9] Its significance is in determining the lower mediastinal shift and other abnormal characters of the apex beat. E.g. in case of LVH, diameter of the apex beat is more than 2.5 cm.

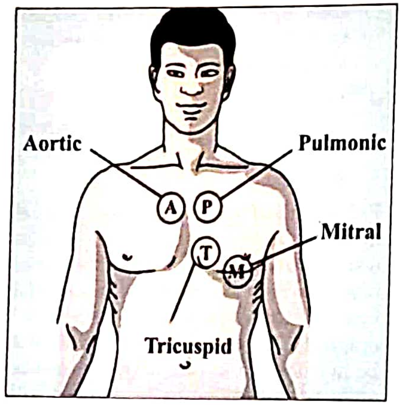

Fig 11.12: Auscultatory areas of the chest in cardiovascular examination

- ⇨ **Mitral or apical area–** this is the region of cardiac apex, normally situated in the left 5th ICS in or near midclavicular line.
- ⇨ **Aortic area –** this area is located in the right sternal border at 2nd ICS.
- ⇨ **Pulmonary area–** this area is located in the left sternal border at 2nd ICS.
- ⇨ **Tricuspid area–** this area is located in left 4th ICS or along the left border of the sternum or at the lower end of sternum near xiphisternum

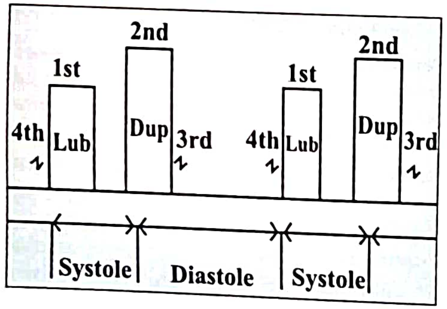

Fig 11.13: Distinguishing character of the S1 and S2 sounds

Heart sounds: heart sounds are produced on closure of the chamber of the heart. On closure of atrioventricular valves (mitral and tricuspid valves), S1 sound is produced and on closure of semilunar valves (aortic and pulmonary valves), S2 sound is produced.

Table 11.1: Distinction between S1 and S2 sounds

	1st heart sound	2nd heart sound
Duration of the sound	Duration of S1 sound is more than duration of S2	Duration of S2 is shorter than duration of S1
Pitch of the sound	Pitch of the S1 is less than that of pitch of S2	Pitch of S2 is more than pitch of S1
Gap between the sounds	The sound which follows the longer pause (diastolic pause)	The sound which follows the shorter pause (systolic pause)
Predominance of the sound	Predominant in mitral and tricuspid areas	Predominant in aortic and pulmonary areas
Relation with carotid arterial pulsation	The sound which precedes carotid pulse	The sound which succeeds carotid pulse

3rd and 4th heart sounds – Additional heart sounds may occur in early (S3) and late (S4) diastole. They result from rapid ventricular filling when AV pressure gradient is high S3 in early diastole and S4 late in diastole (presystole) as atrial contraction gives a boost to ventricular filling.

S3 sound[10] – produced in case of anemia, pregnancy, fever or thyrotoxicosis.

S4 sound[11] – produced in case of intraventricular conduction defects. The presence of S4 sound is always pathological. It is physiological in individuals under the age of 20 years, especially in athletes with physiological hypertrophy. It is rarely heard as it is too soft and too low pitched and is often very close to S1.

Added sounds: As far as examination of cardiac disease is concerned, the significance of auscultation lies in identification of abnormal heart sounds and added sounds. When one discusses the added sounds, the term murmur comes to one's mind.

- ⇨ Murmur is defined as a prolonged series of auditory sounds or vibration of varying loudness (intensity), frequency (pitch), character or quality, duration and configuration.
- ⇨ Murmur is caused by vibration of the valves or walls of heart or great vessels. This is responsible for turbulent flow of blood in the heart.

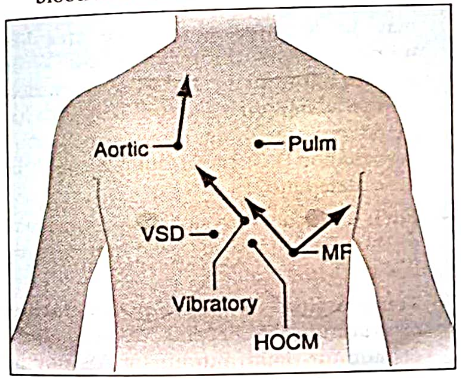

Fig 11.14: Diagnosis of murmur

- ⇨ The distinction between murmur and heart sounds is the timing. Murmur always have a length, which distinguishes it from heart sound which is always transient.

Clinical investigation of murmurs: Characteristic murmurs are produced by various valvular lesions. Diagnosis is helped by preliminary examination of venous and arterial pulses, apex impulse and heart sounds. For example, a loud first sound (S1) with a murmur in diastole indicates mitral stenosis (MS) whereas a sustainable pulse with systolic murmur suggest aortic stenosis (AS). The following factors are necessary to be evaluated while making the diagnosis by murmur.

- ⇨ Timing or position of murmur in the cardiac cycle
- ⇨ Site of maximum intensity
- ⇨ Intensity or loudness
- ⇨ Quality or character
- ⇨ Extent or area of distribution
- ⇨ Pitch
- ⇨ Transmission or direction of selective propagation
- ⇨ Effect of posture, respiration, exercise and other manoeuvres
- ⇨ Presence of thrill
- ⇨ Timing or position of murmur in cardiac cycle – it should be noted whether murmur is systolic or diastolic or continuous?
    - ☐ The phase of systole starts with the onset of S1 sound and ends with the onset of S2 sound. This gap is termed as systolic gap. Similarly the gap present between S2 and next S1 sound is termed as diastolic gap.
    - ☐ If the murmur is observed in systolic gap, then it is being termed as systolic murmur and if the murmur is observed in the diastolic gap, then it is being termed as diastolic murmur.
    - ☐ If the murmur is observed throughout the systolic gap, then it is being termed as pansystolic murmur.
    - ☐ If the murmur is observed in systolic and diastolic gaps, then such murmur is termed as seesaw murmur or to and fro murmur or double or combined murmur. If the murmur is observed both in throughout systolic and diastolic gaps, then such murmur is termed as continuous murmur.

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[10] The presence of S3 sound is usually physiological and it is uncommon after the age of 40 years, becomes audible in normal subjects whenever there is increased velocity of ventricular expansion or recoil e.g. with tachycardia. Pathologically, S3 sound is seen in left ventricular or right ventricular hypertrophy (LVH or RVH), congestive cardiac failure, myocardial infarctionor in hypertension etc.

[11] Abnormal S4 sound – seen in acute massive pulmonary embolism, pulmonary hypertension, acute myocardial infarction, hyperkinetic states of heart such as anemia or hyperthyroidism

- ☐ The timing of murmur is usually easy with a regular and slow heart rate, but it is difficult in the patient of tachycardia or with irregular rhythm, particularly for an inexperienced listener.
- ☐ Systolic murmur is more common than diastolic murmur, may be innocent or insignificant. Diastolic murmur[12] always indicative of valvular or structural heart disease.

⇨ **Site of maximum intensity–** it must be determined by careful auscultation, as it may suggest its site or mode of production, e.g. murmur is observed in mitral area in case of mitral stenosis (MS). The localisation of murmur may be difficult if the murmur is heard all over the precordium in case of aortic regurgitation (AR), but this may be heard best either in aortic area, at inner end of left 3rd ICS or at the apex. The murmur may be diffuse or widespread murmur as in case of coarctation of aorta where the murmur is widely heard over the back and front of the chest. In case of aortic stenosis (AS), murmur is heard all over the chest and up the neck on either side.

⇨ **Intensity or loudness of murmur–** the majority of murmurs are due to rush of blood from a narrowed into a wider section of cardiovascular system which is responsible for turbulent flow of blood. The intensity of murmur will therefore depends upon the difference in calibre between the adjoining narrow and wide section of heart or blood vessel; abruptness of change of calibre; pressure difference; rate of blood flow and external modifying factors such as thickness of the chest wall.

- ☐ Six different grades of intensity are described.
  1. **Grade 1** – audible with difficulty
  2. **Grade 2** – faint but can be heard easily
  3. **Grade 3** – moderate intensity
  4. **Grade 4** – loud
  5. **Grade 5** – louder, but still in need of stethoscope
  6. **Grade 6** – audible without the aid of stethoscope
- ☐ Systolic murmurs of grade 3 or more are significant. Systolic thrills are usually associated with grade 4 or louder murmurs. Diastolic murmurs are classified as loud (louder than heart sounds) or soft (softer than heart sounds) murmurs.

⇨ **Quality or character of murmur–** the quality of murmur may be blowing, rasping, churning, rolling, grating or musical type of sound. Systolic murmurs are usually harsh, churning character whereas diastolic murmurs are of blowing character.

⇨ **Extent or area of distribution–** a murmur may be localised to a small area like mitral stenosis (MS) or diffuse as in mitral regurgitation (MR) or widely diffuse as in aortic stenosis (AS). This has to be performed by inching method of auscultation i.e. precordium should be auscultated inch by inch.

⇨ **Pitch** – in general, systolic murmurs are of medium pitch and diastolic murmurs are low pitched.

⇨ **Transmission or direction conduction of murmur–** this depends upon loudness of murmur (loud murmur of AS may be heard over the head or elbows), conduction nature of adjacent tissue (muscle and bone are good conductors of sound whereas fat, fluid and air will dampen the sound of the murmur), direction of flow of blood stream (in case of AS, the conduction of murmur is towards neck).

⇨ **Effect of posture, respiration, exercise–**

- ☐ **Posture–** diastolic murmurs of mitral stenosis (MS) are better heard in recumbent posture or left lateral decubitus. Diastolic murmur of aortic regurgitation (AR) are best heard in upright posture.
- ☐ **Respiration–** all murmurs should be auscultated during and at the peak of both inspiration and expiration and during holding the breath after expiration. Most of the organic (structural defects) murmurs are louder during expiration and fainter during inspiration. In cardiopulmonary murmurs, the murmur tend to disappear at the height of both inspiration and expiration and is maximum during mid inspiration and mid expiration.
- ☐ **Exercise–** this will lead to the increase in rate of blood flow in the heart, thereby help in detection of murmur which is otherwise inaudible. In this situation, appearance of murmur is transient.

⇨ **Presence of thrill–** thrills are usually associated with low frequency and harsh murmurs. They are usually associated with stenotic or obstructive lesions. Thrills are absent in high pitched or high frequency blowing murmurs.

Chapter Resources

1. Physical diagnosis – a textbook of symptoms and physical signs by Rustam Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
2. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie & Christopher C Evan, 12th Edition, Butterworth Heinmann publications, New Delhi, 1997
3. A manual of clinical surgery by S Das, 4th Edition, Published by Dr S Das, Calcutta, 1998
4. Savill's system of clinical medicine revised & edited by E C Warner, 14th Edition, CBS Publishers, Delhi, 1998
5. The Merck's Manual by Robert S Porter & Justin L Kaplan, 19th Edition, Merck Sharp & Dohme Corp, 2011
6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

Key points of the chapter

⇨ The person suffering from cardiac disease, may be presented with breathlessness, chest discomfort. Depending upon the involvement of chamber of heart, there will be different clinical presentations can be observed which can be categorized into left sided or right sided failure and forward or backward failure. Apart from the case history and physical examination, ECG, chest X ray, echocardiogram, cardiac enzymes assessment and coronary angiogram will be adding value to the diagnosis of cardiac disease.

⇨ Clinical symptoms observed in left sided heart failure are various degrees of breathlessness ranging from exertional breathlessness, paroxysmal nocturnal dyspnoea, orthopnea, Cheyne Stokes breathing, cough with pink frothy sputum, syncope, oliguria and nocturia.

⇨ Clinical symptoms observed in right sided heart failure are pain in right upper quadrant, bilateral pedal oedema, loss of appetite, nausea, vomiting, bleeding per rectum.

⇨ General examination include clubbing,

GK [12] Diastolic murmur may suggest the diagnosis of aortic regurgitation (AR); continuous murmur may indicate the diagnosis of PDA (Patent Ductus Arteriosus) or AV fistula assessment of pedal oedema, peripheral pulses assessment, blood pressure, cyanosis – central and peripheral.

- ⇨ Systemic examination include inspection, palpation, auscultation.
  - ☐ Inspection include size, shape and type of chest, shape of precordium, apical thrust, suprasternal or epigastric pulsation
  - ☐ Palpation include location of apical impulse, palpation of abnormal pulsations in precordium other than apex impulse, palpation of thrills
  - ☐ Auscultation include assessment of heart sounds S1, S2, S3 and S4 and diagnosis of murmurs

Probable questions may be asked in the examination

MCQs

1. **Diagnosis of thrill is ---------- finding.**
   - a. Inspection;
   - b. Palpation;
   - c. Percussion;
   - d. Auscultation

   Answer -(b)

2. **The diagnosis of continuous murmur is done when one hears murmur in**
   - a. Systolic pause;
   - b. Diastolic pause;
   - c. Both 1 and 2;
   - d. None of the above

   Answer -(c)

3. **The diameter of apex impulse during palpation of precordium in left ventricular hypertrophy is**
   - a. < 2.5 cm;
   - b. < 4.5 cm;
   - c. > 2.5 cm;
   - d. upto 1 cm

   Answer -(c)

4. **The visible jugular venous pulsation in the patient in semirecumbent posture indicates**
   - a. Cor pulmonale;
   - b. Tricuspid stenosis;
   - c. Both a and b;
   - d. None of the above

   Answer -(c)

5. **Cough with pink frothy sputum in a patient indicates**
   - a. Right ventricular dysfunction;
   - b. Right atrial dysfunction;
   - c. Left atrial dysfunction;
   - d. All of the above

   Answer -(c)

6. **The location of which of the following pulsation is between medial malleolus and Achille's tendon?**
   - a. Anterior tibial pulse;
   - b. Posterior tibial pulse;
   - c. Dorsal pedis pulse;
   - d. Brachial pulse

   Answer -(b)

7. **Paroxysmal nocturnal dyspnoea indicates the site of the lesion at**
   - a. Left atrial dysfunction;
   - b. Right atrial dysfunction;
   - c. Right ventricular dysfunction;
   - d. All of the above

   Answer -(a)

8. **Which of the following regarding S1 sound is true?**
   - a. The duration of S2 is longer than S1;
   - b. The pitch of S2 is shorter than S1;
   - c. The sound which comes soon after diastolic pause is S1;

   - d. The sound which comes soon after the diastolic pause is S1

   Answer -(d)

9. **Which of the following regarding apex impulse is false?**
   - a. It is heard in left 5th intercostal space medial to midclavicular line;
   - b. The normal diameter of apex impulse is < 2.5 cm;
   - c. Apex impulse is heard in left 2nd intercostal space sternal border;
   - d. This is mitral area

   Answer -(c)

10. **Apex impulse is not palpated in following conditions except**
    - a. Pericardial effusion;
    - b. Apex impulse is behind the rib;
    - c. Pericardial tamponade;
    - d. Left ventricular hypertrophy

    Answer -(d)

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Alimentary Canal

12

Alimentary canal (digestive system) comprises of comprises the organs from mouth to anus and accessory organs and tissues connected with the digestion of food.

Symptoms related to disease of alimentary canal

Mouth

⇨ **Thirst and dryness of mouth–** this usually reflects the cellular dehydration. This can result from either from diminished intake of fluid or excess loss of fluid from the body. Thirst – severe diarrhoea, polyuria in diabetes mellitus, renal failure or profuse sweating in fever

⇨ **Dryness of mouth–** decreased salivary secretion, mouth breathing in nasal obstruction Excess salivation – increased salivation, can occurs due to irritant lesions of buccal mucosa. E.g. stomatitis, glossitis or tonsillitis etc Apart from these conditions, Parkinsonism, as an accompaniment of nausea, oesophageal obstruction, anxiety states also show above presenting complaint.

⇨ **Difficulty in swallowing, chewing and speaking–** occurs due to diminished salivary secretion, inadequate teeth or ill fitting denture or any painful condition of mouth or throat. Apart from these, Any neurological lesion such as bulbar palsy, facial nerve palsy, cerebro vascular accident involving speech area are showing the above said clinical presentations.

⇨ **Disorder of taste–** observed in any conditions of nasal mucosa, lesions of olfactory nerve, disease of 7th or 9th cranial nerve, in conditions of cerebral lesions such as brain tumour or in case of epilepsy as an aura.

⇨ **Soreness and pain–** soreness is seen in stomatitis, inflammation of buccal mucosa due to local or systemic cause. Soreness is typically observed when very hot or acid foods are taken and during speech, chewing or swallowing. Commonest form of pain is toothache due to dental caries or periodontal abscess. In case of toothache, the pain is usually constant, aching in character, aggravated by chewing or by cold foods and may radiate to ear, temporal region or orbit.

Oesophagus

⇨ **Dysphagia–** dysphagia may be either voluntary (due to the disease of mouth or pharynx) or involuntary (due to the lesion of oesophagus distal to pharynx). Voluntary dysphagia can occur due to painful condition of mouth (stomatitis) or pharynx (pharyngitis). Involuntary dysphagia can be seen in conditions such as carcinoma of oesophagus, achalasia cardia or scleroderma.

⇨ **Pain–** pain usually accompany dysphagia. This is observed in oesophagitis or perforation of lower end of oesophagus or any infection of oesophagus such as candidiasis or herpes simplex.

⇨ **Regurgitation–** reverse peristaltic movement of the contents of pharynx or oesophagus coming through mouth. Expulsion of contents distal to oesophagus is termed as vomiting. In condition such as oesophageal obstruction due to achalasia cardia or carcinoma of oesophagus or Plummer Vinson syndrome regurgitation is observed.

⇨ **Hemetemesis–** expulsion of blood along with vomitus is termed as hematemesis. This is seen in carcinoma of oesophagus or ruptured oesophageal varices in the patient of alcoholic liver disease. This is usually associated with malena (black tarry stools).

Pain abdomen evaluation:

Specific characters of the pain abdomen regarding the site, radiation, character etc will be helpful in the clinical diagnosis of the abdominal pain. As far as abdominal pain is concerned, two types of pain are described based on the organic origin. They are visceral pain and referred pain.

⇨ **Visceral pain–** due to the increase in tension of splanchnic nerve endings in the muscle of affected viscus, this pain is usually seen. When compared to the lesion of digestive system, any lesion of oesophagus, stomach and duodenum, patient will be having pain in the epigastric region; in case of disease of jejunum, ileum, caecum, ascending colon and proximal half of transverse colon will be having pain in the umbilical region and pain in the hypogastric region will be seen in the lesions of distal half of transverse colon, descending colon, sigmoid colon.

⇨ **Referred pain–** this kind of pain is seen in the region other than its origin of pain. This occurs in conditions of inflammatory, haemorrhagic or neoplastic diseases of abdominal viscera upon parietal peritoneum. For example, in the patient suffering from acute hepatitis, he may have referred pain in the right shoulder.

Evaluation of abdominal pain

⇨ **Site–** the abdomen is divided into 9 different regions for the purpose of clinical diagnosis and different organs are being present in these regions. The knowledge of site of the abdominal pain will be helpful in predicting the actual organ of affliction in the disease process. For example, if the person is presented with pain in the epigastric region, we can develop the differential diagnosis by analysing the lesions of oesophagus, stomach, duodenum, pancreas, upper part of kidneys. Final diagnosis can be done based on the nature of clinical presentation, clinical examination.

⇨ **Character of pain–** this includes radiation, character, severity of pain. For example, if the person is having the radiation of pain from epigastric region towards the neck in retrosternal region, we can predict the diagnosis of oesophageal disease. If the person is presented with the radiation of pain from epigastrium towards the back through the left side, then the probable diagnosis is pancreatic disease. As far as character is concerned, if the person is presented with burning type of pain, the probable diagnosis is acid peptic disease. As far as severity of pain is concerned, it varies from slight discomfort of gastric flatulence to agonising pain of peptic ulcer perforation.

⇨ **Conditions aggravating pain–** in conditions of acid peptic disease, consumption of acidic substances will worsen the pain. Gastric ulcer is predicted when the person will be presented with pain worsening on consumption of food substances.

⇨ **Conditions relieving pain–** in conditions of acid peptic disease, the person will be getting relief from pain on consumption of antacids. In gastric ulcer, relief from pain in the epigastrium will be seen after vomiting.

⇨ **Associated features–** in the person presented with constipation or diarrhoea along with abdominal pain, then we can predict the affliction of small or large intestine. In the person presented with jaundice along with pain abdomen, then the probability of hepato biliary system can be predicted. If the person is presented with vomiting along with pain in the epigastric region, probable diagnosis favours towards the involvement of stomach. The involvement of duodenum can be predicted if the person is presented with vomitus containing yellow colour.

Stomach and duodenum

- ⇨ **Pain abdomen–** the person suffering from disease of stomach and duodenum will be presented with pain in the epigastrium radiating to the retrosternal region in case of gastric disease and in duodenal disease, the person will be developing the pain 2 hours after the intake of food.
- ⇨ **Vomiting–** in case of gastric ulcer, the person will be having vomiting which relieves the pain abdomen. In case of pyloric obstruction, vomiting is one of the cardinal symptom which develops during the evening time. In case of duodenal involvement, the vomitus contains yellowish discolouration.
- ⇨ **Hemetemesis–** the term hematemesis refers to the vomiting of the blood. This is seen acute gastritis, carcinoma of stomach. This can also be seen in alcoholic liver disease. This can also be associated with malena (black tarry stools) and vomitus will be having coffee ground appearance.
- ⇨ **Nausea–** this is a sensation of sickness without actual vomiting and is frequently accompanied by salivation, sweating and a feeling of faintness. It can also occur in conditions associated with psychic causes such as unpleasant sights or smells. It usually occurs along with vomiting in case of disease related to digestive system. In case of neurological disease, vomiting will be observed in the absence of nausea.
- ⇨ **Flatulence–** the stomach or intestines are usually distended with gas and the patient's usual clinical presentation is wind or flatulence. It mainly occurs due to the gas enters into the alimentary canal during swallowing or metabolic processes in the intestine or due to bacterial action occurring in the large intestine.
- ⇨ **Disturbance of appetite–** persistent disturbance of appetite is seen in local diseases of stomach such as gastritis or carcinoma of stomach or in certain psychogenic diseases such as anorexia nervosa etc.
    - ☐ Excess appetite can be seen in anxiety states or thyrotoxicosis or diabetes mellitus
- ⇨ Heartburn, water brash and eructations – heart burn is nothing but the presenting complaint of burning sensation in the epigastrium even in retrosternal region this presenting symptom can be observed. This is suggestive of reflux oesophagitis.
    - ☐ Water brash is nothing but filling of the mouth with a watery fluid composed of saliva. It can be accompanied by duodenal ulcer.
    - ☐ Eructations of small amount of gastric acid along with flatus are common in functional or organic diseases of stomach.

Small and large intestines

- ⇨ **Pain abdomen–** pain abdomen originating from small and large intestine are described in the context of general evaluation of pain abdomen.
- ⇨ **Constipation–** average person passes the urge of evacuation once a day. In certain occasions, this may change from once a day to 2-3 times a day as far as rhythm is concerned. The degree of constipation should be noted and character should be noted. All forms of intestinal obstruction including the malignant lesions and neglecting the nature's call or reduced meal or fibre content should be checked.
- ⇨ **Diarrhoea–** the passage of liquid or semisolid stools in a day should be checked. The discharge of mucus or blood in the stools is categorised under dysentery. The probable causes of diarrhoea are
    - ☐ The disease which is of temporary duration (a few hours to few days) such as nervousness, allergic responses to food and drugs), acute infections of alimentary canal
    - ☐ Prolonged infection such as bacillary or amoebic dysentery and intestinal tuberculosis or in cholera
    - ☐ Colonic disease such as neoplasm, ulcerative colitis, irritable colon
    - ☐ Toxic states such as poisoning with heavy metals such as arsenic or toxemia such as uremia
    - ☐ The excessive use of purgatives or pseudo diarrhoea
    - ☐ Malabsorption syndromes such as coeliac disease and chronic pancreatitis
    - ☐ Crohn's disease

Tenesmus– it is the sensation of incomplete evacuation of bowels eventhough the person has passed the bowels and it consists of excess straining with a desire to empty the lower bowel without evacuation taking place.

Hepato biliary system

- ⇨ **Pain abdomen in right upper quadrant–** is suggestive of involvement of liver, gall bladder. In case of liver disease, pain may be observed in right hypochondrium, epigastric region. In case of involvement of gall bladder, pain from right hypochondriac region radiating to right shoulder will be present. In case of cardiac disease too the patient will be having pain in the right upper quadrant, but it can be differentiated from the absence of visible jugular venous pulsation (JVP).
- ⇨ **Jaundice–** the term jaundice refers to yellowish discolouration of skin and mucosa. This is observed ventral surface of tongue, conjunctiva, skin. Depending upon the pathophysiology, jaundice is categorised into 3 categories[1] – hemolytic (pre hepatic), hepatocellular (hepatic) and obstructive (post hepatic) jaundice.
- ⇨ **Bleeding per rectum (intestinal bleeding)–** is specifically seen in alcoholic liver disease leading to portal hypertension. There will be backflow of the blood to superior mesenteric vein resulting in varicosity of haemorrhoidal veins, the outcome is bleeding per rectum.
- ⇨ **Hematemesis–** this can be observed in case of oesophageal varices. This is attributable to backflow of the blood flow to splenic vein due to portal hypertension. This may also be associated with vomiting with coffee ground appearance as well as malena (black tarry stools).
- ⇨ **Itching–** this is occurring mainly due to the deposition of bile salts in the skin of the patient. This is mainly seen in obstructive jaundice.
- ⇨ **Abdominal distension–** this is attributable to portal hypertension. This is resulting in ascites.

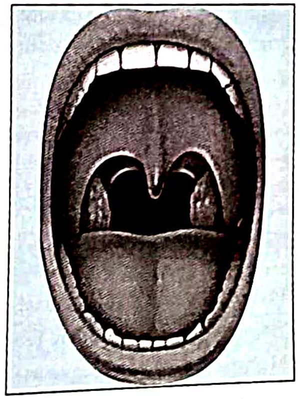

Fig 12.1: Image of oral cavity

- ⇨ Oral mucosa[2] is seen which is normally

GK

[1] Clinical causes of pre hepatic jaundice – any condition where RBC destruction is raised or any defect in conjugation of bilirubin
Clinical causes of hepatic jaundice – any condition involving liver
Clinical causes of post hepatic jaundice – any condition of gall bladder or common bile duct 2nd part of the duodenum

[2] Observe for any mouth ulcers, aphthous ulcers, malignancy, collagene vascular disease, herpes simplex stomatitis, oral thrush

pink, smooth and painless.

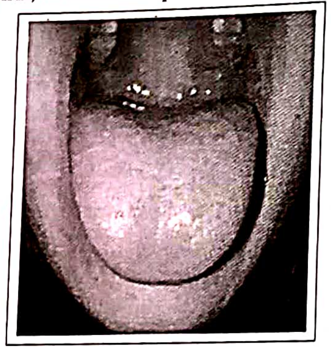

Fig 12.2: Image of bald tongue

- ⇨ Inspect the inner and outer surfaces of lips, angles of mouth, gingiva, teeth, floor of mouth, upper and lower surface of tongue, tonsils, palate and pharynx.
- ⇨ Tongue should be protruded to bring its posterior third into view.
- ⇨ Inspect the sides and ventral surface of the tongue.
- ⇨ Palpate the sides of the tongue with gloved hand for the detection of any induration.
- ⇨ Gentle pressure on anterior aspect of relaxed tongue to enable the inspection of oropharynx, part of nasopharynx and epiglottis.

Examination of teeth

- ⇨ Number of teeth, discolouration of teeth, presence of dental caries, abnormal configuration, presence of artificial denture
  - ☐ Staining of the teeth due to tobacco
  - ☐ Mottled yellow appearance in fluorosis
  - ☐ Yellowish appearance in children due to tetracycline therapy

Examination of gums

- ⇨ Status of gums should be noted
- ⇨ Any hypertrophy of gums, discolouration of gums, atrophy of gums, presence of ulcers on gums
  - ☐ Ulceration and sloughing of tongue in case of Vincent's angina (infection by spirochetes and fusiform bacilli
  - ☐ In lead poisoning, appearance of blue line at the border of the gum that can be due to deposition of lead sulphide in gum tissue.
  - ☐ Scurvy, gums are soft, spongy, swollen and bleed easily
  - ☐ Gingivitis, deep red congestion of gums, which bleed easily on touch
  - ☐ **Hypertrophy of gums:** in pregnancy and in long term phenytoin intake in the patient of epilepsy, scurvy

Examination of tongue

- ⇨ Status of tongue, shape of the tongue, discolouration of tongue, character of tongue, movement of tongue, hypertrophy and atrophy of the tongue, cracks and fissures
  - ☐ **Atrophy of the papillae–** in case of vitamin B12 deficiency anemia
  - ☐ **Pale and bald tongue–** in case of iron deficiency anemia
  - ☐ **Magenta coloured tongue–** in case of riboflavin deficiency
  - ☐ **Beefy red appearance–** in case of niacin deficiency
  - ☐ **Tremors of the tongue–** parkinson's disease, anxiety state, chorea etc
  - ☐ **Enlargement of the tongue–** acromegaly, Myxoedema, Down's syndrome

Examination of the abdomen

Natural landmarks of the abdomen which are used for localising the lesion of the abdomen in relation to anterior abdominal wall are xiphisternum, umbilicus or navel, symphysis pubis, right and left costal margins, right and left tubercles of iliac crests, linea alba and linea semilunaris.

Artificial landmarks of the abdomen: there are several methods are being described, first one dividing the abdomen into four quadrants – right upper quadrant (RUQ), right lower quadrant (RLQ), left upper quadrant (LUQ) and left lower quadrant (LLQ). This method of division does not permit delineation of certain important regions of abdomen, such as epigastric or hypogastric regions.

The better way of subdivision of abdomen is dividing the abdomen into nine regions with the help of two vertical lines and two horizontal lines. The vertical line on either side is drawn upwards through mid-inguinal point, or midway between the midline of the abdomen and anterior superior iliac spine. The upper horizontal line crosses the abdomen along the lowest levels of the costal margins or 10th costal cartilage while lower horizontal line connects the tubercles of iliac crests.

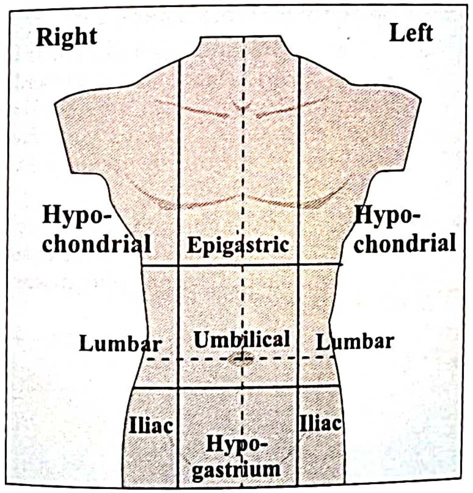

Fig 12.3: Schematic drawing of nine quadrants of abdominal region

- ⇨ While doing the examination of the abdomen, the physician has to do certain arrangements.
- ⇨ The patient should have empty urinary bladder.
- ⇨ The ideal position of the examination is supine position in most occasions, in case of assessment of indirect inguinal hernia, the patient is examined in upright posture.
- ⇨ The physician has to stand on the right side of the patient.

Table 12.1: Organs observed in nine quadrants of the abdominal region

Right hypochondriac region: Right lobe of liver, gall bladder, part of duodenum, hepatic flexure of colon, part of right kidney and right supra renal gland	Epigastric region: Pyloric end of stomach, duodenum, pancreas, aorta, part of the liver	Left hypochondriac region: Stomach, spleen, tail of pancreas, splenic flexure of colon, upper part of right kidney, part of left lobe of liver
Right lumbar region: Ascending colon, lower half of right kidney, part of duodenum and jejunum	Umbilical region: Omentum, tranverse colon, lower part of jejunum and ileum	Left lumbar region: Descending colon, lower half of left kidney, portions of jejunum and ileum
Right iliac region: Caecum, appendix, lower end of ileum, right ureter, right spermatic cord in male, right ovary in female	Hypogastric region: Ileum, urinary bladder, gravid uterus	Left iliac region: Sigmoid colon, left ureter, left spermatic cord in male and left ovary in female

- ⇨ The patient should be exposed from xiphisternum to pubic symphysis. The genitals should be exposed only when one is suspecting either inguinal hernia or femoral hernia etc to preserve the modesty of the individual.
- ⇨ The patient hands should be on the sides of the abdomen or folded over the chest to ensure proper relaxation of abdominal muscles. Otherwise, when the patient raises his hands over his head will lead to the stretching and contraction of abdominal muscles. This will lead to the difficulty in

palpation of abdomen.

- ⇨ Before performing the palpation of the abdomen, the person has to point out area of pain. This is done because, if one starts the palpation of the abdomen right from the beginning, then further palpation of abdomen is difficult. Therefore, to ensure the complete examination of the abdomen, painful part of the abdomen should be palpated last.
- ⇨ Before palpation, the physician has to rub his both palms so that warmth of the physician's hands will not cause the contraction of the abdominal muscles.
- ⇨ The fingers should be properly manicured because long nails may harm either self or patient.
- ⇨ While doing the palpation, the patient has to turn the head to the left side to ensure that warm expired air can be avoided in this pattern. While turning the head to the left side, he should breathe through open mouth to ensure the deep breathing so that proper relaxation of the abdominal muscles will be present.
- ⇨ Distract the patient if necessary with your conversation or questions.
- ⇨ Approach slowly and avoid quick unexpected movements.
- ⇨ Watch the patient's face closely for any signs of pain or discomfort. This will help to determine the severity of the discomfort in the abdominal region.
- ⇨ Proceed in the orderly fashion with inspection, auscultation, percussion and palpation. Assess the liver, spleen, kidneys, urinary bladder and aorta and other internal viscera.

Inspection

- ⇨ Contour or shape of the abdomen – basically three types of contour are observed – namely globular (round), flat and scaphoid (boat shape).

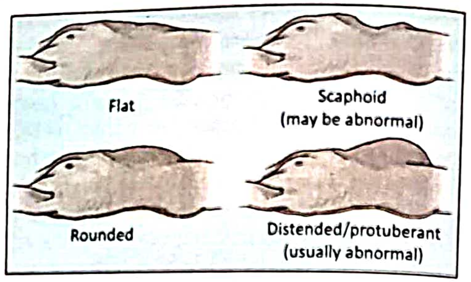

Fig 12.4: Image showing different contours of the abdomen

- ☐ Globular abdomen is where anterior abdominal wall presents a forward convexity. This is seen in 5Fs (fat – obesity, fluid – ascites, flatus – large bowel obstruction, faeces – chronic constipation and fetus – pregnancy)
- ☐ Flat abdomen is usually seen in young adults i.e. chest wall and abdominal wall lie in the same level
- ☐ Scaphoid or boat shaped abdomen is where anterior abdominal presents a forward concavity or sunken appearance. This is seen in wasting diseases, chronic malnutrition, cancer cachexia, dehydration.

- ⇨ **Asymmetry of the abdomen**– the person may have localised swelling which can help us in predicting the probable disease of the individual.

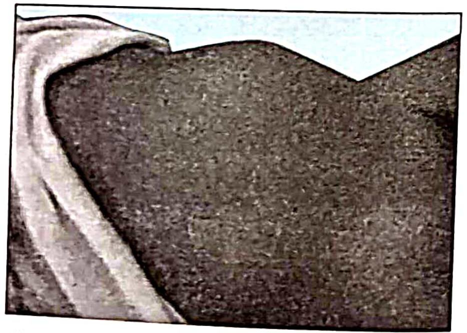

Fig 12.5: Image of patient of acute retention of urine

- ☐ This kind of abdominal swelling can arise from either from the abdominal wall or from internal viscera. This can be identified by asking the patient to raise the hands above his head. If the swelling of the abdomen becomes more pronounced, then it indicates that the swelling arises from abdominal wall and if the swelling disappears after this manoeuvre then it implies that the swelling is arising from intra abdominal region.
- ☐ Area of localised swelling will be helpful in making the clinical diagnosis. If the person is having the swelling in the epigastric region, that may suggest that the person is suffering from any disturbance related to stomach. If the person is having the swelling in the lower abdomen, it may suggest that the person is suffering from either disorder related to urinary bladder or sigmoid colon or uterus in case of females.

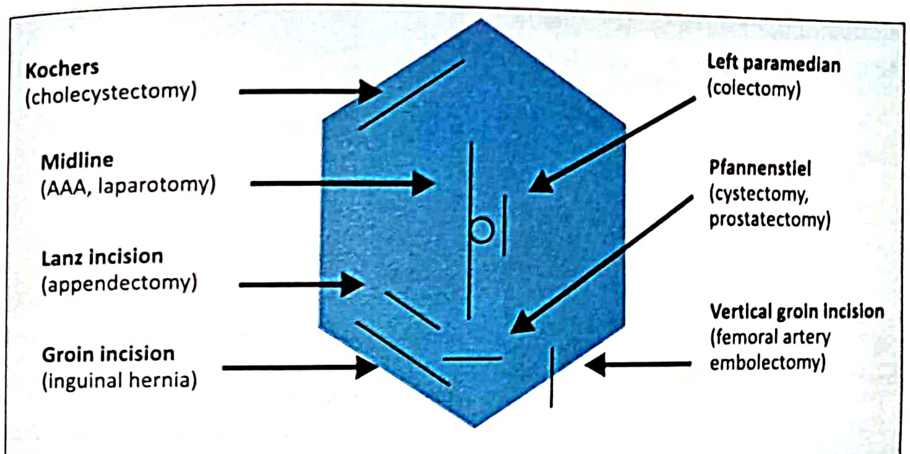

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Fig 12.6: Image showing schematic representation of different surgical scars seen in abdominal region

- ⇨ **State of the skin** – visible linear scars helps us in predicting the previous abdominal surgery that the patient underwent. White lines on either sides of the lower abdomen is termed as linea albicantes which may suggest the previous stretching of the abdomen such as obesity or pregnancy or abdominal growth.
- ⇨ **State of the umbilicus**– normally umbilicus is indrawn or flush with skin surface. In case of certain diseases, the nature of the umbilicus varies. For example, when the person is suffering from huge ascites, the umbilicus will stretch laterally. This is termed as smiling umbilicus. The umbilicus may stretch vertically in case of huge ovarian cyst. In case of the infection related to the umbilicus, there will be pus discharge observed. Huge swelling can be seen in umbilical hernia.

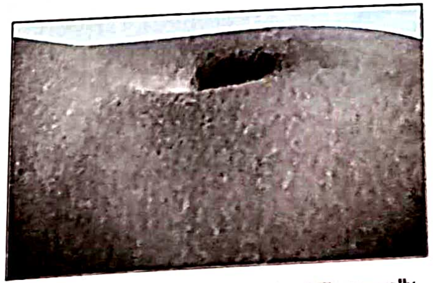

Fig 12.7: Image showing inverted umbilicus usually seen in obesity

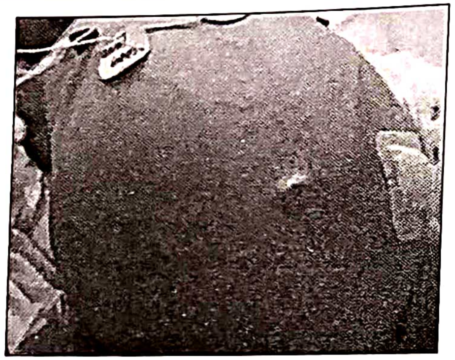

Fig 12.8: Image showing everted umbilicus in the patient of ascites

- **Visible arterial pulsations–** when the person is lean, arterial pulsations are seen in the epigastric region. This implies the transmitted pulsation of abdominal aorta.
- **Visible veins–** visible veins on the shiny abdomen which appear radiating from the umbilicus, may imply that the person is suffering from cirrhosis of the liver. If the varicose veins are observed in the abdomen on either side, may suggest the probable diagnosis of inferior vena caval obstruction.
- **Visible peristalsis–** when the person is suffering from obstruction in the alimentary canal for longer duration, the peristalsis is visible. The direction of visible peristalsis will help in the clinical diagnosis. For example, if the peristalsis is visible from left to right, implies the probable diagnosis of pyloric obstruction. If the peristalsis is visible from right to left side, it implies that the person is suffering from obstruction at the level of splenic flexure or transverse colon.
- **Diastasis of the recti–** while doing this, we ask the patient to sit from the recumbent posture. Due to weakness of linea alba, abdominal contents appear to come out of the aperture that occurs due to the weakness of linea alba.
- **Respiratory movements–** normally, males will have abdominal or abdominothoracic breathing and females will have thoracic or thoracoabdominal breathing pattern. If the individual is suffering from either peritonitis or diaphragmatic paralysis or huge ascites or large intraabdominal tumour, abdominal movement during respiration is restricted only the thorax will move during respiration.

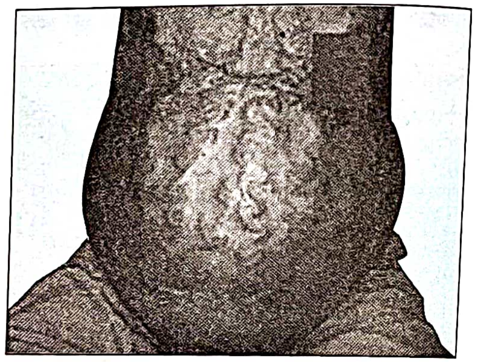

Fig 12.9: Showing visible varicosities in the abdomen seen in inferior vena cava obstruction

Auscultation:

Auscultation is an important part of abdominal examination. It is best carried out in deep expiration and with light application of chest piece over all the four quadrants of the abdomen.

- **Peristaltic sounds (bowel sounds)–**Normal peristaltic sounds[3] heard over the abdomen are noises caused by the peristaltic action of the bowel wall on the fluid and gas contents within; these are more marked in the empty bowel. The stethoscope should be kept on the abdominal wall a little right to the umbilicus.
  - ☐ Increased peristaltic sounds (borborygmi) in intensity and frequency are seen in small intestinal obstruction, severe GI bleeding
  - ☐ Absent peristaltic sounds (silent abdomen) are seen in paralytic ileus which is a condition observed in peritonitis or in post surgical cases.
- **Vascular sounds–** this is heard in the epigastric region in lean individuals and in the person having abdominal aortic aneurysms. This sound is usually synchronises with heart sounds.
- **Succession splash –** a splashing sound due to the presence of both fluid and air in the stomach elicited by shaking the patient. The splash is particularly seen in pyloric obstruction. This is significant if elicited 2 hours after food intake or drink.

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[3] Normal peristaltic sounds are clicks and girdles occurring at a frequency of 5 to 34/ minute.

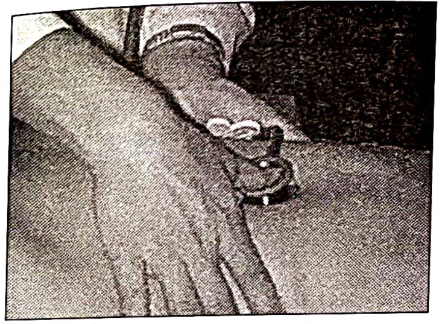

Fig 12.10: Image showing the examination of succussion splash in the patient of pyloric stenosis

Percussion:

The techniques are similar in most of the rules of percussion except a lighter stroke is preferred in case of examination of the chest.

- **Normal percussion** note of abdomen is tympanic note which is greatly occupied by stomach and intestines except the areas of liver and spleen.
- **Abnormal dullness** of the abdomen is usually observed in abdominal tumour, cyst, enlargement of spleen or liver, enlarged lymph nodes, aortic aneurysm, secondaries of malignant tumours, ascites
- **Increased tympanic** note on left hypochondriac region is indicative of excess gas in the stomach or splenic flexure.
- **Ascites:** This is a condition where collection of free fluid in the peritoneal cavity is present. Over 1500 ml of fluid must collect in the peritoneal cavity before its presence can be detected by physical examination. Its presence can be predicted by symmetrical bulging of flanks of abdomen in recumbent position or prominence of hypogastrium in the erect posture. This clinical presentation confirms the diagnosis of ascites. The following specific tests can be performed to make the diagnosis of ascites,

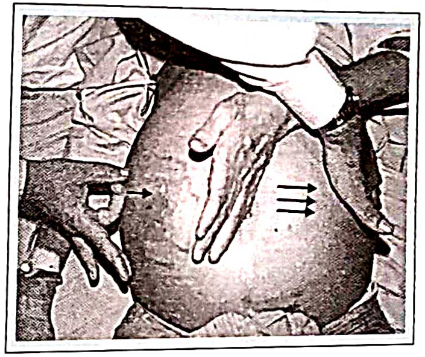

Fig 12.11: Image showing fluid thrill test

- **Fluid thrill test**[4] – This test is elicited by placing one hand over one flank, while with the finger or fingers of another hand a sharp flick or tap is delivered over the opposite flank. By this manoeuvre, a fluid wave is generated in the fluid and is transmitted to other side of the flank and this movement is felt by the hand on the other side. To avoid the false detection of thrill, in the person with thick fat abdominal wall, ulnar edge of the finger has to be placed in the linea alba of the patient either by patient or by third person. This technique will help to avoid the vibrations generated by fat in the abdominal wall.
- **Horse shoe shaped dullness–** in case of

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[4] Differential diagnosis for ascites by the method of fluid thrill are
Large ovarian cyst
Hydramnios
Large hydronephrosis

ascites with moderate amount of fluid, fluid thrill test cannot be performed. In case of mild presence of fluid, the accumulation is confined to the flanks in lying down position. In case of moderate presence of fluid, the accumulation of fluid is can be observed in flanks, pubic and suprapubic regions and in the umbilical regions, this is detected by method of horse shoe shaped dullness. In this, we have to start the percussion from the mid point in the epigastric region to the sidewards and we have to note the presence of dullness. Then we have to start the percussion from the point below the earlier point of percussion to the sidewards. This method of percussion will give us the area of tympanic note resembles the shape of horse shoe. That is the reason, the clinical skill is termed as horse shoe shaped dullness.

- **Shifting dullness–** this is also being termed as disappearing dullness. First, the clinician starts doing the percussion from the midpoint of epigastric or umbilical region towards lateral side till he gets dull note in the abdomen. After getting the dull note, ask the patient to turn to one side. Wait for few seconds. This will lead to the floating of the intestines in the ascitic fluid giving the tympanic note. After this, percuss the abdomen towards the side of the turning of the body, we will get the dull note in a new area. This is shifting dullness.
- **Puddle's sign–** this method is helpful to detect the little amount of ascitic fluid (even as little as 120 ml). To elicit the sign, the patient lies in the prone position for 5 minutes. Then the patient goes on 'all fours' position, so that the middle portion of the abdomen is dependent. One flank is then percussed by repeated light flicking at a constant intensity and the diaphragm of the chest piece of stethoscope is placed on the most dependent part of the abdomen where the fluid puddle collects.

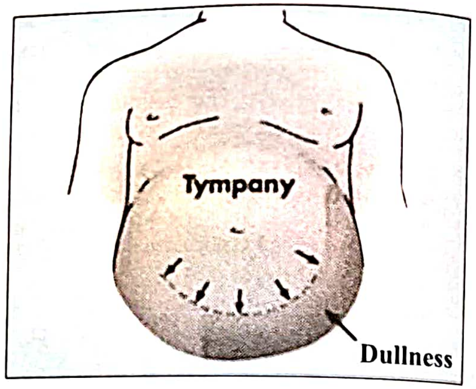

Fig 12.12: Image showing test of horse shoe shaped dullness

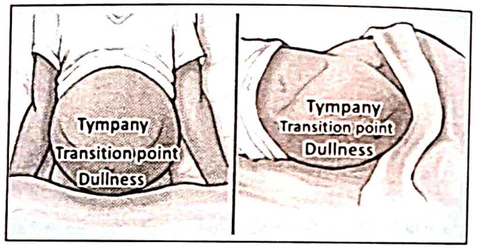

Fig 12.13: Image showing test of shifting dullness

Palpation

As already discussed, palpation is the technique of physical examination which is used to analyse the observation made during inspection, regarding the size of the abnormal liver or characteristics of tumour etc. In case of per abdominal palpation, several techniques are adopted so as to get maximum information after palpation of the per abdominal examination. Four types of palpation are employed in per abdominal palpation. They are.

- **Superficial palpation–** a gentle or light superficial palpation of the abdomen is advisable at the beginning to start with. The main advantage is it will give assurance to the patient and it enables the physician to get general information regarding abdomen. It should be done with right hand of the physician.
  - Tenderness or muscle guarding on superficial palpation indicates inflammation or enlargement of organ or new growth affecting internal viscus.
  - In case of routine examination in the absence of the pain abdomen, one should start from suprapubic region, left iliac region and in the anticlockwise direction, he should reach umbilical region.
  - In case of pain abdomen, the superficial palpation should start from non tender region to tender region.
  - In case of circumscribed area of tenderness associated with hypersensitivity or hyperalgesia of overlying abdominal skin can be demonstrated by pinching the skin and subcutaneous tissues with fingers.

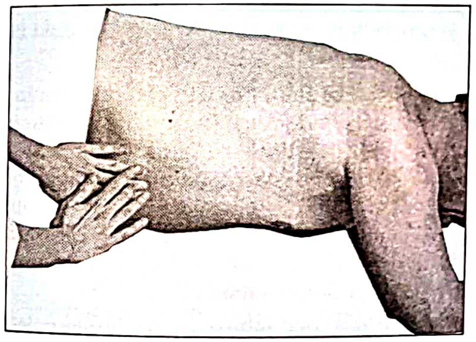

Fig 12.14: Image showing test of Puddle's sign

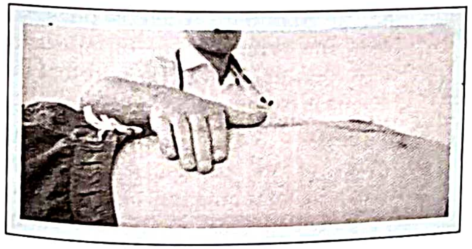

Fig 12.15: Image showing the method of palpation

- **Deep palpation–** as far as deep palpation is concerned, it should be done with more pressure with one hand and in obese individuals, two hands should be used keeping another hand over the palpating hand. Right hand should be used to do the deep palpation.
  - In case of routine examination in the case of absence of pain and in painful abdomen, the method of deep palpation should be followed as that of superficial palpation.
  - Deep palpation should be done with volar surfaces of the flexed fingers and flexion should be done at metacarpophalangeal joints and one should not poke the fingers into the abdomen so as to avoid unnecessary muscle contraction of the muscles of abdominal wall. Sudden and jerky movements of palpating hand should be avoided and firm pressure should be maintained throughout the deep palpation.
  - Make sure that while doing palpation, the patient should take deep breath through open mouth.
- **Bimanual palpation–** the term bimanual palpation is used when two hands are used to analyse the status of the organs such as kidneys, spleen. For the palpation of kidney, one hand is kept under the loin with the tips of extended fingers resting against the erector spinae muscle, the other hand being placed flat over the abdomen with fingers pointing upwards towards the costal margin. The patient is asked to take deep breath while firm pressure is applied from both hands. In case of enlarged kidney, swelling can be palpable between the gap present in between the palpating hands.
- **Palpation by dipping method–** this method is employed when the person is suffering from ascites, as ordinary palpation cannot yield the desired outcome of the palpation. In this method, tips of examiner's extended

fingers are suddenly pushed into the abdomen with a quick stabbing movement in order to depress the abdominal wall and then equally quickly withdrawn. Such a procedure, by displacing the fluid for the time being, permits the fingers after a series of such movements, to reach and feel any solid organ or lump which may be masked due to the presence of intra-abdominal fluid.

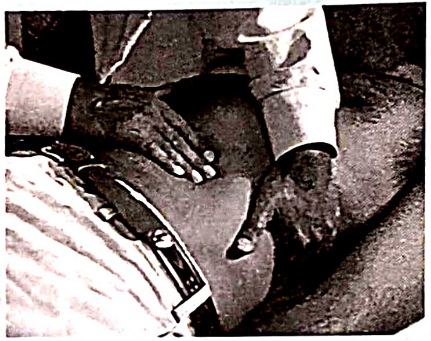

Fig 12.16: Image of bimanual palpation of left kidney

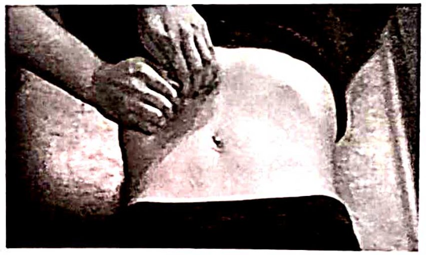

Fig 12.17: Image of palpation by dipping method, examination of liver in the patient of ascites

Normal structures which may be felt during abdominal palpation are

1. **Abdominal aorta**– a systolic thrust in the epigastric region against bony spine in thin individuals.
2. The bodies of lower lumbar vertebrae, in case of lordosis in particular
3. Lower border of liver during deep inspiration where diaphragm may pull the liver downwards and in case of emphysema lower border of liver is definitely palpable.
4. Right kidney in thin individuals and lax abdominal walls, in multiparous women. Lower pole of the kidney is palpable in the height of inspiration.
5. **Transverse colon**– in youth and elderly people with lax abdominal walls, as a transversely placed elongated structure just above the umbilicus.

Abnormal palpatory findings

⇨ **Muscle guarding or rigidity**– an inequality in the resistance encountered in the abdominal wall. It must be carefully observed. First it should be noted whether the person voluntarily does the muscle contraction or it is involuntary it should be noted.

- ❑ First of all, try to deviate the attention of the individual during the palpation. Ask questions such as what he has taken breakfast today? Or what is the main event happened today in your office etc. While the person is trying to give the answer, the physician should start deep palpation.
- ❑ When the physician encounters less or no resistance while doing palpation during answer, then it is considered as muscle guarding[5]. When the physician feels the same nature of resistance as earlier, then it can be said that the person is having muscle rigidity[6].

⇨ **Tenderness**– experience of pain during palpation of the abdomen is always indicative of inflammation of underlying organ, provided local tenderness of the abdominal wall should be ruled out.

⇨ Deep seated tenderness can be ruled out by eliciting rebound tenderness[7]. In this type of examination, fingers should be pressed on the painful part, later, pressure should be removed immediately. This manoeuvre is leading to the pain on the affected part.

❑ **Oedema of abdominal wall**– this can be elicited by either digital pressure which leads to the pitting on pressure or picking up a fold of skin and subcutaneous tissues will lead to the pitting of the oedema. This can also be evident by keeping the diaphragm of stethoscope. The diaphragm of stethoscope will be responsible for the circular depression on the abdominal wall.

⇨ **Mass of the abdomen**– palpable intraabdominal mass or lump is caused by enlargement of a solid organ; distension of hollow viscus; presence of neoplasm or mass of inflammatory tissue.

- ❑ **Position of the mass or anatomical relationship**– here the physician should note about swelling whether it is intrabdominal or of abdominal wall? This can be determined by raising the shoulders above the head. If the swelling is becoming evident, then we can say the swelling is of the abdominal wall and if the swelling is not so evident, then it can be assumed that the swelling is intraabdominal. Position of the mass in relation to nine quadrants of the abdomen should be noted.
- ❑ **Size of the lump**– whether the swelling is large or small; whether the swelling moves along with respiration should be noted. For example, if one gets the large swelling in the right hypochondriac region, then it can be assumed that the person is suffering from malignancy of the liver; when we can get the small palpable liver in the right hypochondriac region, the cirrhosis of the liver can be diagnosed. Swelling moving down along with inspiration, then it can be said that the swelling might be due to the liver pathology.

⇨ **Massive spleen may indicate** diagnosis of leukemia, chronic malaria.

- ❑ **Consistency**– swelling arising from malignancy is considered be very hard in consistency, whereas cystic swellings are having fluid consistency; whereas the fecal masses are usually indentable.
- ❑ **Surface and contour**– smooth surface of the swelling in the right hypochondriac region indicates hepatomegaly and irregular surface may indicate cirrhosis of liver. Hard surface of the liver may indicate malignant lesion of liver.
- ❑ **Tenderness**– presence of tenderness on palpation indicates the inflammatory pathology in the underlying organ.
- ❑ **Movement with respiration**– swelling arising from liver, spleen, stomach and kidney are palpation during deep inspiration.
- ❑ **Pulsation** – pulsation in the epigastrium in thin individual indicates the pulsation in the abdominal aorta. Pathologically, pulsation in the epigastrium is seen in abdominal aortic aneurysm.
- ❑ **Mobility** – mobility of the lump is determined by gently pushing the swelling in various directions. Immobility may indicate malignant condition.

Palpation of liver

Is done by two methods. The patient should be in the supine direction with exposure from xiphisternum till pubic symphysis. The physician should stand on the right side of the patient.

⇨ In the first method, the physician should use the radial border of the index finger.

GK [5] Muscle guarding is observed in case of local inflammation such as acute appendicitis.

[6] Muscle rigidity is seen in case of peritonitis or acute intestinal obstruction or tetanus or meningitis. In case of diffuse peritonitis, the physician encounters board like rigidity.

GK [7] Acute appendicitis will be having rebound tenderness.

This should start from right iliac fossa to the right hypochondriac region. Gradually, the physician should come to the right hypochondriac region. Normally, inferior border of the liver is palpable in the right hypochondriac region.

- In the second method, both hands are used to palpate the liver. Hands are kept in such a way that both hands are stretched in the direction of clavicle.

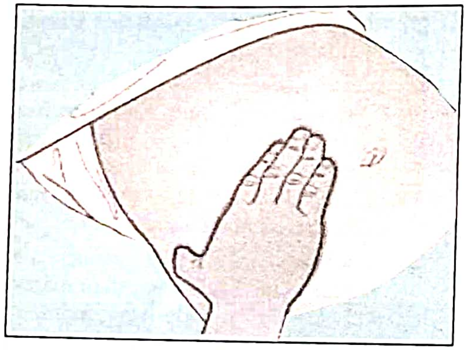

Fig 12.18: Image of palpation of liver

- **Size or degree of liver enlargement**[8] **in relation to costal margin**– this is expressed as +, ++ and +++ (1, 2 or 3 finger breadths or more) below the right costal margin
- **Surface of liver**– smooth surface[9] or rough surface should be noted.
- **Tenderness**[10] **of liver**– palpation should be done in the right hypochondriac region
- **Edge of liver** – while palpation, edge of the liver should be palpated and its border should be noted whether smooth or rough, regular or irregular
- **Consistency**[11]– whether soft or firm consistency should be noted.
- **Movement on respiration**– liver swelling will move downwards on inspiration and moves up on expiration.
- **Pulsation**– pulsation is normally seen in epigastric region in thin individuals.

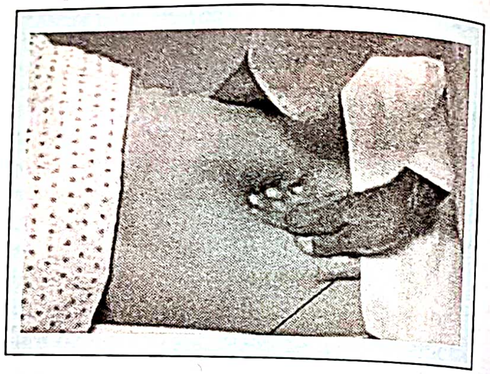

Fig 12.19: Image of palpation of spleen

- **Palpation of spleen**– while doing the palpation of spleen, the patient has to be in the supine position with exposure from xiphisternum to pubic symphysis. The lower limbs should be flexed at the knee joint level. The physician has to stand on the right side of the patient. Spleen has to palpated bimanually i.e. with the help of both hands. The left hand of the physician will be kept posteriorly over left lumbar region and right hand is placed flat over the left hypochondriac region. The patient is asked to take the deep breath through open mouth. At the peak of inspiration, left hand should be pushed towards the anterior side of abdomen and right hand is pushed back at the right hyponchondriac region. Normally splenic swellings[12] are not palpable. When the swelling is more than twice the normal size, then only splenic swellings are palpable.

GK

[8] Mild enlargement in viral hepatitis; moderate enlargement in hepatitis, cirrhosis and obstructive jaundice; massive enlargement in secondary depositis in liver, leukemia Hodgkin's disease, CCF and amyloidosis

[9] Smooth surface of liver is seen in congestion of liver and hard surface is seen in malignancy of liver.

[10] Tenderness in right hypochondriac region, indicates congestion in the liver or hepatitis (inflammation of liver)

[11] Soft consistency in case of portal hypertension; hard consistency and in case of cirrhosis of liver

[12] Malaria, hereditary spherocytosis, acute leukemia etc

- **Palpation of gall bladder**– while doing the palpation of gall bladder, first one has to identify the location of left anterior superior iliac spine. Then one has to draw the imaginary straight line passing through the umbilicus meets usually at the right costal margin at right mid clavicular line. This is the point of gall bladder. If the physician starts palpating gall bladder and if he analyses tenderness in the region, then it can indicate inflammation at the gall bladder.

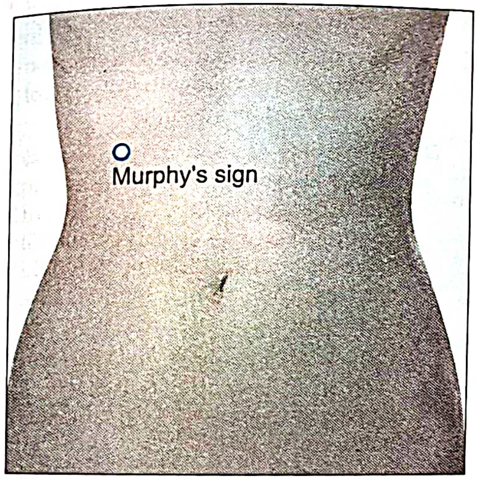

Fig 12.20: Image of palpation of gall bladder

- **Palpation of kidneys**– bimanual method of examination is adopted while palpation of kidneys. Left hand is kept behind the costovertebral angle and exerts the pressure on the kidney and right hand is kept high in hypochondrium, and pressure is applied backwards. The manoeuvre is helpful in analysing the kidney swellings.

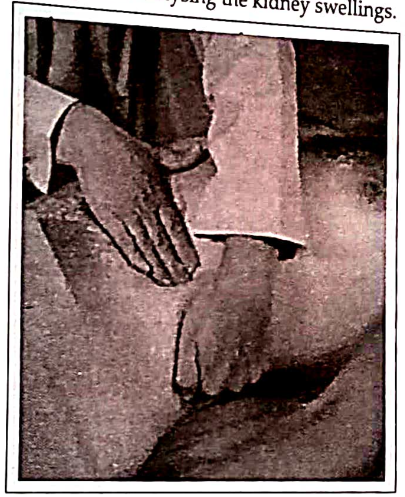

Fig 12.21: Image of palpation of kidney

Chapter Resources

1. Physical diagnosis – a textbook of symptoms and physical signs by Rustam Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
2. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie & Christopher C Evan, 12th Edition, Butterworth Heinmann publications, New Delhi, 1997
3. A manual of clinical surgery by S Das, 4th Edition, Published by Dr S Das, Calcutta, 1998
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6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

Key points of the chapter

⇨ For the convenience of easy diagnosis, the alimentary canal is divided into two parts – upper alimentary tract (GIT) from mouth to duodeno-jejunal junction (area of Ligament of Treitz) and lower alimentary tract (GIT) from jejunum to anus. For example, if a person is presented with dysphagia or loss of appetite or yellowish coloured vomiting etc indicates upper GIT involvement and frank bleeding per rectum or constipation or diarrhoea etc indicates the affliction of lower GIT.

⇨ As far as examination of alimentary canal is concerned, one has to do the examination of oral cavity, gums, teeth, tongue, anus and rectum completes the examination along with examination of per abdomen.

⇨ In the examination of per abdomen, for better localization of the lesion, abdomen is arbitrarily divided into 9 regions – left and right hypochondriac region, epigastric region, left and right lumbar region, umbilical region, left and right iliac region and hypogastric (suprapubic) region. Examination is being carried out as inspection, auscultation, percussion and palpation.

☐ Inspection include contour of abdomen, abdominal asymmetry, state of the skin, state of the umbilicus, visible arterial pulsations, visible veins, visible peristalsis, respiratory movements.

☐ **Auscultation is helpful in identifying normal and abnormal peristaltic sounds** – borborygmi and paralytic ileus. Vascular sounds in the epigastric region and succession splash are the two other types of sounds heard on auscultation.

☐ **Percussion–** is done to analyse tympanic note usually heard in epigastric region and dull note heard on percussion of liver, ascites. Special lists of test for ascites done are fluid thrill test, shifting dullness and horse shoe shaped dullness.

☐ **Palpation include four different ways of palpation–** superficial palpation, deep palpation, bimanual palpation and palpation by ballotment. Palpation is done to note the tenderness on palpation, muscle guarding, muscle rigidity.

Probable questions may be asked in the examination

MCQs

1. **Kidney is being palpated by**
   - a. Superficial palpation;
   - b. Deep palpation;
   - c. Bimanual palpation;
   - d. Palpation by ballotment

   Answer -(c)
2. **Tenderness at McBurney's point is confirmatory of the diagnosis of**
   - a. Appendicitis;
   - b. Hepatitis;
   - c. Cholecystitis;
   - d. Colitis

   Answer -(a)
3. **Surgical scar observed in the area of Pfannstiel's incision confirms the history of**
   - a. Cholectomy;
   - b. Caesarian section;
   - c. Cholecystectomy;
   - d. Splenectomy

   Answer -(b)

4. **Which of the following conditions, where globular shaped abdomen is not seen?**
   - a. Obesity;
   - b. Large ovarian cyst;
   - c. Ascites;
   - d. Advanced stage of carcinoma of stomach

   Answer -(d)
5. **Which of the following test is being performed in case of minimal amount of ascites in present in peritoneal cavity?**
   - a. Fluid thrill test;
   - b. Shifting dullness;
   - c. Horse shoe shaped dullness;
   - d. Puddle sign

   Answer -(d)
6. **Normal peristaltic sounds observed on auscultation of the per abdomen are**
   - a. 1 to 10/ minute;
   - b. 5 to 34/ minute;
   - c. 40 to 60/ minute;
   - d. 0 to 1/ minute

   Answer -(b)
7. **Tympanic note is normally heard on percussion of ------------.**
   - a. Epigastric region;
   - b. Hypogastric region;
   - c. Umbilical region;
   - d. Right iliac fossa

   Answer -(a)
8. **The presence of yellowish coloured vomitus after vomiting indicates the site of the lesion present in**
   - a. Oesophagus;
   - b. Stomach;
   - c. Both a and b;
   - d. Distal to second part of duodenum

   Answer -(d)
9. **The ideal sequence of examination per abdomen among the following is**
   - a. Inspection, Palpation, Percussion and Auscultation;
   - b. Inspection, Auscultation, Percussion and Palpation;
   - c. Inspection, Percussion, Palpation and Auscultation;
   - d. Inspection, Palpation, Auscultation and Percussion

   Answer -(b)
10. **Which of the following conditions will be having voluntary phase of dysphagia?**
    - a. Carcinoma of oesophagus;
    - b. Cardiospasm;
    - c. Barret's oesophagus;
    - d. Dental caries

    Answer -(d)

***

13

Locomotor System

The term locomotion refers to the movement. It is also called as Musculo skeletal system. It involves bones, muscles, tendons, ligaments, joints and spine.

Approach to Musculo skeletal disease

⇨ **Anatomic localization of complaint (articular vs. nonarticular)–** first of all, anatomical localisation of the joint should be analysed. Articular involvement should be considered when the person is presented with pain in the joint (joint surfaces) associated with joint swelling and worsening of the pain on active as well as passive movement of the joint. In case of non articular (ligament, tendon or bursa) involvement, the person will be having pain in the region situated far from the joint surface and pain worsens on active movement and usually not on passive movement.

⇨ **Determination of the nature of the pathologic process (inflammatory vs. noninflammatory)–** inflammatory joint swellings are associated with any signs of inflammation (erythema, warmth, pain and swelling), systemic symptoms such as fatigue, fever, rashes and weight loss) or laboratory evidence of inflammation such as elevated ESR, elevated CRP level, thrombocytosis, anemia of chronic disease or hypoalbuminemia. Non inflammatory musculo skeletal diseases are usually related to trauma (rotator cuff injury), repetitive use (bursitis, tendinitis), degeneration or ineffective repair (osteoarthritis). Non inflammatory diseases are usually presented with pain without synovial swelling or warmth, absence of inflammatory or systemic features and negative laboratory investigations.

⇨ **Determination of the extent of involvement (monoarticular, polyarticular, focal, widespread)–** whether one joint or multiple joints afflicted or diffuse joint afflicted should be analysed. Further, symmetrical or asymmetrical joint afflicted should be evaluated. For example, when one individual is presented with joint pain with swelling and fever, then probable diagnosis favours septic arthritis. When the person is presented with asymmetrical multiple joint involvement and fever is observed in case of rhematic fever. When the person is presented with multiple, symmetrical smaller joint involvement confirms the diagnosis of rheumatoid arthritis.

⇨ **Determination of chronology (acute vs. chronic)–** the chronology of events is an important diagnostic feature and divided into onset, evolution and duration. The onset of disease is short in septic arthritis and gout and prolonged in osteoarthritis (OA), rheumatoid arthritis (RA) and fibromyalgia. Acute conditions tend to be infectious, crystal induced or reactive. Chronic conditions tend to be non inflammatory or immunological. The extent of articular involvement is often diagnostic. It may be either articular or non articular.

- ❑ Articular disorders are usually classified based on the number of joints afflicted. The description of this kind of analysis is mentioned above. Crystal induced and infectious diseases such as gout and mono articular or oligoarticular (less than 3 joints) afflicted.

- ❑ Non articular disorders are classified either focal or widespread. Presenting complaints secondary to tendinitis or carpal tunnel syndrome are usually focal involvement and poliomyelitis and fibromyalgia are usually diffuse in clinical presentation.
- ❑ Upper extremities are usually involved in rheumatoid arthritis (RA) and osteoarthritis whereas lower extremities are usually involved in case of reactive arthritis and gout at the onset.

⇨ Identification of the nature of the underlying process and the site of the complaint will enable the examiner to narrow the diagnostic considerations and to assess the need for immediate diagnostic or therapeutic intervention.

- ❑ The clinical history should identify the precipitating events in the manifestation of the disease. Certain comorbidities usually predispose certain typical or atypical clinical presentation.
- ❑ Diabetes mellitus may predispose carpal tunnel syndrome, renal insufficiency may predispose gout, similarly, psoriasis (psoriatic arthritis), myeloma (low back pain), osteoporosis (pathological fracture).

⇨ **Formulation of a differential diagnosis–** a variety of musculo skeletal diseases may be presented with systemic features. For example, fever (SLE or infection), skin rashes (SLE or psoriatic arthritis), nail abnormalities (psoriatic or reactive arthritis), myalgia (fibromyalgia or myopathy), weakness (polymyositis or neuropathy).

⇨ Thus, while analysing the case of musculo skeletal disease, elaborate analysis of the patient is necessary.

Common symptoms of locomotor system

⇨ **Pain–** pain may originate from bone and periosteum, capsule and synovia of joints, ligaments, tendons and muscles. Bony pain is usually continuous, aching and disturbs sleep. Pain arising from joint is often sharp and related to movement and associated with stiffness. Pain of joints of limb is well localised with exception of hip, where the pain may be referred to knee. In the joint of vertebral column, pain may get worsened on sneezing, coughing and straining for defaecation. Muscular pain is usually described as stiffness and poorly localised, deep seated and aggravated by use of affected muscle and usually worsened at night time. Involvement of tendon, ligament and adnexae can be predicted by pain on active movement and not on passive movement and pain arises from the region present remote to the joint surfaces.

⇨ **Deformities–** the deformities may be noticed by the patient or relatives of the patient. Certain deformities are confirmatory of specific pathological process in the body. For example, the presence of swan neck deformity or button hole deformity may suggest the diagnosis of rheumatoid arthritis. The presence of Heberden's nodes in the hand may confirm the diagnosis of osteoarthritis. Mallet finger deformity observed in the distal interphalangeal joint suggests the diagnosis of chronic trauma occurred to the deformed finger.

⇨ **Impaired movement–** most of the Musculo skeletal diseases are associated with pain with or without movement. This may also be associated with stiffness of the affected joint. For example, the stiffness observed in the affected joint in the morning hours and symptoms may improve as the day progresses. In case of osteoarthritis, the patient may develop the pain worsens after the movement of affected joint. In hip arthritis, all movements of hip joint are restricted with pain.

⇨ **Cracking and creaking–** minor clicks in the finger joints produced by hyperextension are of no clinical significance, nor clicks arising in shoulder joint or scapula. In case of severe osteoarthritis of knee joint, cracking sound is heard on movement of knee joint while changing the position from sitting to standing posture.

- ⇨ **Constitutional symptoms–** fever and sweating are associated with joint involvement in case of septic arthritis and rheumatic fever. Rashes observed in the skin associated with joint involvement may aid in the diagnosis of psoriatic arthritis.

General examination

Systemic examination: can be considered under inspection, palpation and range of movements.

Insection –

- ⇨ All major joints should be inspected to check the gross deformity[1], displacement of bone or enlargement of bone, swelling, discolouration.

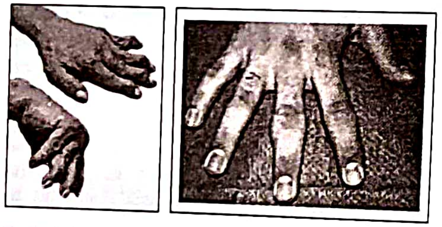

Fig 13.1: Image of ulnar deviation of fingers, swan neck deformities in the patient of rheumatoid arthritis

- ⇨ Later, he will assess regarding the range of active movement and the patient's ability to use the joints for everyday activities such as gripping, putting on shoes, eating, combing the hair etc.
- ⇨ Nodular lesions, swelling of tendon sheaths or muscle wasting around the joint
- ⇨ Distribution of the joint changes should be noted throughout the body as this may be helpful in differential diagnosis.

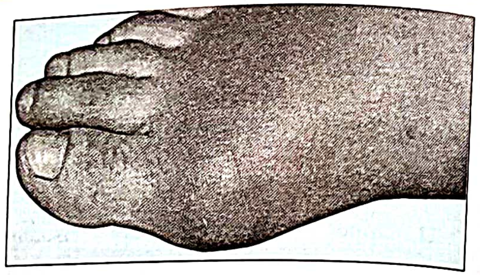

Fig 13.2: Image showing swelling of great toe of right lower limb in the patient of gout

Palpation

- ⇨ Palpation should be gentle and sudden sharp movements should be avoided.
- ⇨ The patient's face should be watched for the signs of distress when the joints are moved or tender parts are exposed.
- ⇨ Local raise of temperature should be checked with the back of the fingers as these may be more sensitive than palmar surface which may imply the raised blood flow to the palpated part.

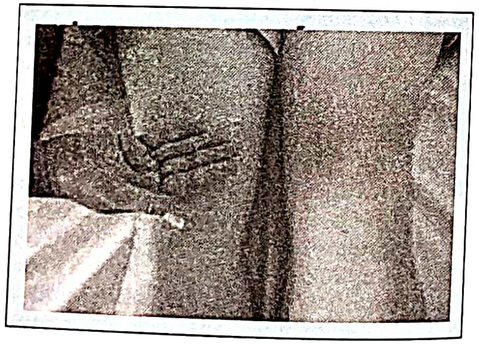

Fig 13.4: Image showing the examination of local raise of temperature in the joints palpation of joints

- ⇨ Tenderness of the joint, bone or ligament should be checked
- ⇨ To determine the anatomical origin and consistency of any swelling (fluid, synovial, bony, cartilaginous, tendinous subcutaneous)

---

[1] swan neck deformity

- ⇨ To measure the range and power of the joint at each joint

Range of movement

- ⇨ Active movement test the function not only of the joint under consideration, but also of the tendons, muscles, nerves.
- ⇨ Passive movements test the status of the joint itself.
- ⇨ When movement is limited by pain or fixation an attempt is made to determine the cause.
  - ☐ If bone, cartilage or synovial membrane is diseased, movement is restricted in all directions and tenderness is generalised.
  - ☐ If capsule or ligament is damaged, movement towards the affected structure relieves the pain. Tenderness will be detected locally and an effusion may be present.
  - ☐ If an intra articular structure is damaged (detached semilunar cartilage in knee), then movement is restricted by pain when the joint is compressed towards the detached ligament and relieved by the movement away from it.
  - ☐ Complete lack of joint movement if associated with pain, traumatic or acute inflammatory lesion can be diagnosed. If not associated with pain, then the diagnosis could be ankylosis or arthrodesis.

Table 13.1: Showing different joints and their movements

Joint	Movements
Jaw	Open and shut; Protrusion and retraction and side to side
Spine (cervical and thora-columbar)	Flexion and extension; Lateral flexion (right and left); rotation (right and left)
Shoulder	Flexion, extension, abduction, adduction, internal and external rotation
Elbow	Flexion
Forearm	Pronation and supination
Wrist	Flexion and extension, ulnar and radial deviation
Fingers MP joints	Flexion and extension
Fingers IP joints	Flexion and extension
Hip	Flexion, extension, abduction, adduction, internal and external rotation
Knee joint	Flexion and extension
Ankle and foot	Flexion, extension, eversion, inversion, plantar and dorsi flexion
Toes MP joints	Flexion, extension
Toes IP joints	Flexion, eversion and inversion

Chapter Resources

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6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

Key points of the chapter

- ➪ The term locomotor system refers to movement. It involves bones, muscles, tendons, ligaments, joints and spine.
- ➪ Approach to musculo skeletal or locomotor system involves the following steps:
  - ☐ **Anatomical localization of the complaint–** whether articular or non articular. In case of articular involvement, joint surfaces are tender and non articular involvement, bones, muscles, tendons, ligaments are tender.
  - ☐ **Inflammatory or non inflammatory–** in case of inflammatory diseases, signs of inflammation (swelling, redness, pain, local rise of temperature and loss of function) are seen whereas in non inflammatory diseases usually related to trauma or repetitive use or degeneration or ineffective repair. Rheumatoid arthritis is an example of inflammatory joint disease. In osteo arthritis without joint effusion, non inflammatory pathological presentation can be seen.
  - ☐ **Number of joints afflicted whether monoarticular or polyarticular?** In case of osteoarthritis, it is usually monoarticular and in case of rheumatoid arthritis or rheumatic fever, polyarticular involvement can be observed.
  - ☐ **Chronology of symptoms –** acute or chronic. Onset of disease is short in septic arthritis and gout; in conditions such as rheumatoid arthritis and fibromyalgia, the duration of illness is chronic.
- ➪ As far as symptoms of musculo skeletal diseases are concerned, pain, deformities, movement difficulties, cracking and creaking sound on movement of the joints and constitutional symptoms such as fever, sweating etc are associated.
- ➪ As far as examination of the musculo skeletal diseases are concerned, it is subdivided into inspection, palpation and range of movement.
  - ☐ Inspection include checking the swelling, deformity, visible redness, displacement of bones, relation with movement of joints in relation to daily activities such as eating, combing the hairs etc.
  - ☐ Palpation include tenderness, warmth, crepitus assessment.
  - ☐ Range of movement – each and every major joint should be tested regarding the range of movement.

Probable questions may be asked in the examination

MCQs

1. **Heberden's nodes are seen in which part of the body?**
   a. Hand;
   b. Neck;
   c. Foot;
   d. Back
   Answer -(a)

2. **Z deformity is seen in which part of the hand in the patient of rheumatoid arthritis?**
   a. Index finger;
   b. Middle finger;
   c. Ring finger;
   d. Thumb
   Answer -(d)

3. **Opposition is the movement of which of the following joint?**
   a. Elbow;
   b. Shoulder;
   c. Ankle;
   d. Thumb
   Answer -(d)

4. **Crepitus is**
   a. Inspection finding;
   b. Palpation finding;
   c. Auscultatory finding;
   d. None of the above
   Answer -(b)

5. **Tophi are the deformities seen in**
   a. Rheumatoid arthritis;
   b. Rheumatic fever;
   c. Gout;
   d. Osteoarthritis
   Answer -(c)

6. **Find the one which does not belong to one group.**
   a. Rheumatoid arthritis;
   b. Rheumatic fever;
   c. Gout;
   d. Septic arthritis
   Answer -(d)

7. **Flexion and extension only are possible in which of the following joints?**
   a. Elbow joint;
   b. Knee joint;
   c. Both a and b;
   d. None of the above
   Answer -(c)

8. **Dorsiflexion is the movement of**
   a. Knee joint;
   b. Hip joint;
   c. Ankle joint;
   d. Shoulder joint
   Answer -(c)

9. **Pronation is the specific movement of**
   a. Wrist;
   b. Forearm;
   c. Elbow;
   d. Shoulder joint
   Answer -(b)

10. **Which of the following is not an inspection finding?**
    a. Deformity;
    b. Discolouration of the joint;
    c. Swelling;
    d. Crepitus
    Answer -(d)

***

Neurogolical Evaluation

14

History of neurological evaluation is done in following headings

1. Age of the patient
2. Temporal course of the illness
3. Subjective description of the patient
4. Corroboration of the history by the associates
5. Family history and social history
6. Medical illnesses – past history
7. Drug use, abuse
8. History of malignancy
9. Formulation of the impression of the patient
10. Interviewing with relatives
    1. **Age of the patient:** Certain diseases such as cerebro vascular accident are usually observed in the elderly people, Duchenne muscular dystrophy is usually seen in young individuals.
    2. **Temporal course of the illness–** this is very important to predict the precise appearance and progression of the symptoms experienced by the patient. For example, let us take the example of the cerebro vascular accident. This illness can manifest in an individual either because of ischemia or haemorrhage in the affected part or temporary ischemia which will recede within 24 hours. Each pathophysiology can be presented with typical symptoms. When the person is developing the loss of strength suddenly in the one side of the limbs, ischemia could be the probable pathophysiology. When the presented with gradual loss of the strength in right upper limb followed by right lower limb, which is followed by altered state of consciousness, then we can predict the cause of the illness could be haemorrhage in the brain. When the person is presented with reduced strength which gets resolved within minutes, then the probable cause could be transient ischemic attack. Thus, the chronology of the symptoms will help in the diagnosis of the disease.
    3. **Subjective description of the complaint:** Subjective description of the complaint should be analysed. For example, when the person is presented with reduced strength or weakness, one should analyse what the actual presenting complaint is. Some people may say complete loss of strength and some others may complain partial loss of strength. The term numbness refers to some individuals as complete loss of sensation in affected part whereas some others may mean complete altered sensations and some others may mean pins and needles sensation. Specific questions may clarify the quality, intensity, distribution, duration and frequency of each symptom. Specific disabilities should be described quantitatively for example, patient walks at most 25 ft before taking rest and its effect on the patient's routine activities.
    4. **Corroboration of history by other associates:** There are certain situations, where the suffering individual cannot himself say accurate description of the 'presenting complaint. In such occasion, one has to take the help of his associates or family members. For example, in case of the epilepsy, the person cannot describe the history of the presenting complaint, then one has to take the history from his accompanying person. One should take the help of the associates, in case of memory loss, personality changes or personality disorders, drug abuse and excess alcohol usage.
    5. **Family history:** Most neurological conditions presenting in early childhood or early adulthood are of heredofamilial. E.g. hypertension, cardiac disease, cerebro vascular accident. Certain metabolic, muscle, nerve and neurodegenerative diseases are inherited. Here, the question regarding consanguineous marriage among parents has to be enquired.
    6. **Medical illnesses:** Complete review of systems is essential because neurological complications are common in other diseases such as diabetes mellitus, hypertension or hypotension, abnormalities of blood, vascular disorders such as aneurysm of aorta, recent history of myocardial infarction or abnormal lipid profile should be analysed.
    7. **Drug use, abuse and toxin exposure:** For example, the person with aminoglycoside antibiotics (gentamycin/neomycin/streptomycine group of drugs) may exacerbate the symptoms of weakness in the patients of myasthenia gravis (MG).
    8. **History of malignancy:** Patient with malignancy will have unexpected and unusual neurological complications. For example, if the person is presented with bleeding per rectum for past 6 months and is diagnosed to be suffering from carcinoma of rectum. He may present with loss of strength in either side of the body. This can be attributable to metastasis of the tumour cells into the brain.
    9. **Formulating the impression of the patient:** Use the opportunity while taking the history to form an impression of the patient.

The diagnosis of neurological conditions is one of the most satisfying skills in clinical medicine. This is considered to be one of the easiest systems to be examined if one knows the neuroanatomy and physiology thoroughly. In neurological disorders, the history is especially important because it gives information about the cause of the disorder. The historical information may be itself may be diagnostic e.g. attacks of epilepsy, episodes of sudden onset of vascular diseases, multiple sclerosis, degenerative diseases and neoplasms. Let us take the example of spinal cord disease in the order of the clinical presentation.

Table 14.1: showing the nature of symptoms observed in spinal cord affliction due to intrinsic and extrinsic cause

Intrinsic cause	Extrinsic cause
Urge incontinence/ retention of urine	Root pain worsened by movement
Dissociated sensory loss	Progressive asymmetrical paraparesis
Spinothalamic pain	Brown Sequard syndrome
Bilateral corticospinal tract signs	Paraplegia with sensory level
Paraplegia and sensory level	Incontinence/ retention of urine and faeces

Examination of neurological diseased patient: The neurological examination begins with careful observation of the patient entering the examination area and continues during history taking. The patient's speed, symmetry, co-ordination while moving to the examination table, posture, gait should be noted.

Examination of nervous system is being categorised into

1. Higher mental functions
2. Speech

3. Cranial nerve examination
4. Motor system examination
5. Sensory system examination

Higher mental functions:

The brain is concerned with the maintenance of consciousness and mental function in addition to its role in controlling power, sensation and control of vital functions such as respiration, cardiac function.

⇨ **Handedness:** This has to be assessed based on the usage of the hand in most of one's day today activities. This is important in assessing the dominance of the cerebral hemisphere. The person may be either right-handed or left-handed. While analysing the handedness, one should not assess the handedness based on the usage of hand in writing. Because, the person who uses the right hand to write, he may use the left hand for other purposes such as combing the hair or threading the needle or throwing the ball or pull the cork out of the bottle or picking the spoon while eating food or lifting the bucket etc. One should assess the dominance of the hand depending upon the use of the hand in various activities done by the patient. It is being said that most of the right-handed individuals will have the dominance of left cerebral hemisphere. Most of the left-handed individuals (70%) will have left cerebral hemisphere dominance. This is of prime importance because speech centre is located in the dominant cerebral hemisphere.

⇨ **Mini mental status examination–**

☐ Gestures, grimaces, mannerisms and other motor expressions should be noted whether spontaneous or provoked; constant/abrupt/ fitful?

☐ **Attention–** easily obtained/ kept or can it be not aroused or wandering? If inactive, patient resist passive movements/ obey commands or indicate awareness at all?

☐ **Talk–** form of patient's utterances rather than content is considered; says much/ little; talk spontaneously/ only in answer; slow/ fast; hesitantly/ promptly; to the point/ wide out of it/ coherently/ loosely or with interruptions?

☐ **Mood–** how do you feel in yourself? Whether irritability, suspicion, fear, unreality, worry, restlessness, bewilderment and many more varieties of mood should be assessed. Observe the continuity of mood, influences with change and appropriateness of patient's apparent emotional state to what he says

☐ **Delusions, hallucinations** (olfactory, gustatory, tactile, visual or auditory) and illusions should be tested.

☐ **Compulsive phenomena–** obsessional thoughts, impulses/ acts and if so, from with or without part of patient's own mind should be analysed.

☐ **Orientation of space, person and time–**

a. **Orientation of space–** the questions such as 'where are you now?', 'where are you coming from?' etc should be asked

b. **Orientation of time–** the questions such as 'what is the time now?' etc.

c. **Orientation of person–** the questions such 'what is the name of the person who is accompanying you?', 'what is the name of the spouse?' etc should be asked.

⇨ **Memory and orientation in time, place and person:** This is tested by asking the patient to state the names of his relatives, address of his home, dates of birth, place of birth, place where he is present at that particular time. His ability to obey simple commands is tested.

☐ Loss of recent memory is more common than long term memory loss. This can be tested by to recall something what he has read or to repeat something he has just been told

☐ **Memory tests:**

⇨ **Immediate recall and attention:**

1. **Name and address test–** 3 line name and address and asked to repeat immediately. Note how many times errors are made in repeating before it is repeated correctly
2. **Babcock sentence–** ask the patient to repeat; correct if the patient repeats in three attempts
3. **General information–** related to patient's occupation or general knowledge questions etc
4. 100 – 7 test

⇨ **Short term memory–** About 5 minutes after asking patient to repeat to remember the address name and address and ask him to repeat or ask the patient to recall 3 objects after 5 minutes delay.

⇨ **Long term memory–** Ask the patient a question about the past, such as 'what colour of suit did you wear at your wedding?' or 'what was the colour of the car you first bought?' etc.

⇨ **Calculation–** 100 – 7 test; or 2*8 = ?; or financial calculation etc

⇨ **Abstract thought–** a sentence should be given and he should say the brief description for that sentence. For example, a stitch in time saves nine; approximate weight of the elephant etc. This information will be helpful in diagnosing the frontal lobe lesion, dementia or psychiatric illness

⇨ **Spatial information:** Tasks such as clock face, map test or copying the triangle should be given to the patient. This will be helpful in diagnosis of parietal and occipital lobe function and in dementia.

⇨ **Concentration–** Ask the patient to spell a 5 letter word forward and backward such as 'World' etc.

⇨ **Abstract reasoning–** Ask the patient to identify a unifying theme between 3 or 4 objects (all are fruits except, all are modes of transportation except or all are musical instruments except). Ask the patient to interpret a moderately challenging proverb such as 'all that glitters is not gold' or 'people who live in glass houses should not throw stones at others' houses' or 'knowledge is power' or any popular proverb in a language the patient knows.

⇨ **Judgement–** Ask the patient a hypothetical situation requiring good judgement such as 'what would you do if you find a stamped letter on the sidewalk?'. Placing the letter to the mailbox could be the correct answer, in stead he gives the answer such as opening the letter or throw it in the dustbin could suggest personality disorder.

⇨ Episodes of unconsciousness due to epilepsy or trauma may be followed by a period of memory loss which can precede the onset of coma.

⇨ Mental symptoms such as hallucinations, delusions and abnormalities of conduct may result from organic brain lesions as in cerebral atherosclerosis and neoplasm.

⇨ Disturbances of consciousness: Mental function depends upon full consciousness. This may be lost partially in stupor or completely in coma, apart from the cyclical physiological loss known as sleep.

☐ **Causes of altered consciousness:**

⇨ **Severe cerebral lesions–** trauma, vascular insults like stroke, cerebral tumour

⇨ **Fever–** exert indirect effect on brain

⇨ **Toxaemia–** exert indirect effect on brain

⇨ **Global cerebral damage–** larger brain damage

⇨ Switching off reticular formation

☐ Grading of altered consciousness

⇨ 1st classification

1. Delirium
2. Stupor

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3. Semicoma
4. Coma

⇨ **2nd classification:**

1. Alert
2. Drowsy but response to verbal stimulation
3. Unconsciousness, no response to verbal commands, but withdrawal response to pain
4. Unconsciousness with flexion of upper and lower limbs to pain (decorticate lesion)
5. Unconsciousness with hyperextension of upper and lower limbs to pain (decerebrate lesion)
6. Unconsciousness with no response

⇨ **3rd classification:** Glasgow Coma scale (EMV score)

Table 14.2: Showing Glasgow Coma scale (EMV score)

Eye opening	Motor response	Verbal response
Spontaneous – 4	Oriented – 5	Obeying – 6
To speech – 3	Confused – 4	Localising – 5
To pain – 2	Inappropriate – 3	Withdrawal – 4
No response- 1	Incomprehensible – 2	Flexion – 3 (decorticate lesion)
	No response – 1	Extension – 2 (decerebrate lesion)
		No response – 1

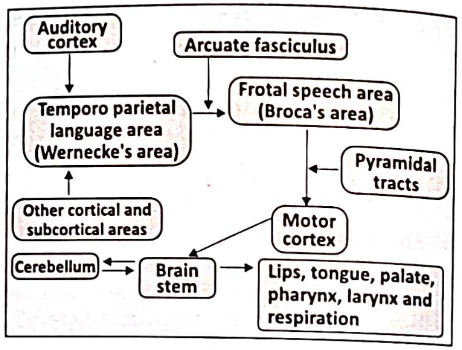
Best EMV score: 15 and worst EMV score: 3

Speech: Speech enables the communication of ideas from person to person by the use of verbal symbols produced by the larynx, pharynx, lips and tongue. This means communicating, expressing or understanding thoughts and ideas through the medium of symbols which may take the form of written or spoken words.

⇨ For speech function to be intact, not only the higher centres must be intact, the motor mechanism which controls the articulation must be perfect.

⇨ **Important areas of language production:**

- ☐ Broca's area
- ☐ Wernicke's area – in posterior part of superior temporal gyrus
- ☐ Inferior parietal lobule
- ☐ Fronto parietal operculum


Auditory cortex
Arcuate fasciculus
Temporo parietal language area (Wernecke's area)
Frotal speech area (Broca's area)
Pyramidal tracts
Other cortical and subcortical areas
Motor cortex
Cerebellum
Brain stem
Lips, tongue, palate, pharynx, larynx and respiration

Flowchart 14.1: Speech centre and its connections

Wernicke's area in dominant side is important in comprehension of received speech and in the selection of words to expressed ideas.

Broca's area is important for fluency and rhythm of speech and maintenance of grammar and syntax.

Disorders of speech can be divided into three groups

a. Those affecting the higher centres in brain – dysphasia/ aphasia – disturbance of speech as intellectual function

b. Those interfering with motor execution speech – dysarthria/ anarthria

c. Those involving the dysfunction of vocal cords – dysphonia/ aphonia

a. Aphasia:

This usually affects all modules of language such as speech production and comprehension, reading and writing.

☐ **Examination of the patient of aphasia:**

⇨ Full history is taken from the patient or relative

⇨ Previous history of speech abnormalities such as stuttering, reading/ writing difficulties or deafness

⇨ Language skills usage should be noted and also the patient's natural knowledge

⇨ Hand preference is important including ambidexterity as well as family history of left handedness

⇨ Speech assessed for fluency, patient is asked to repeat words and naming common objects

⇨ In addition to it, patient's comprehension of spoken language, reading and writing should be assessed.

☐ **Spontaneous speech:**

⇨ May be fluent or non fluent speech

⇨ At its most, non fluent speech consists of a complete loss of speech and phonation found in immediate aftermath of left sided hemisphere damage. After some recovery, they may only say yes or no etc.

⇨ In contrast to non fluent aphasia where word output is reduced, fluent aphasia is near or above normal in terms of output which may be incomprehensible, because it contains non-existant words i.e. neologisms, wrong words or paraphasias.

☐ **Examination of speech:**

⇨ **Speaking–** for spontaneous speech, repeating the words, naming the objects

⇨ **Listening–** to verbal commands such as put out your tongue, touch your left ear, to explain the meaning of simple words or phrases

⇨ **Reading–** reading aloud a paragraph or written commands

⇨ **Writing–** to write patient's name and address, previous occupation, his presenting complaints

☐ **Site of the lesion:**

⇨ Non fluent speech is associated with anterior hemisphere lesions and fluent speech is associated with posterior hemisphere lesions.

⇨ Nominal dysphasia: naming defect is common to many speech defects should be tested by asking the patient to name common objects.

⇨ Reading assessment must take account of the patient's education and after he has been asked to read aloud and his comprehension is tested.

⇨ In motor aphasia, the ability to write is usually lost which is termed as agraphia. First the possibility of weakness in arm and hand must be excluded to diagnose this. Writing ability is tested by first single words and then sentences should be given.

⇨ Contralateral hemiparesis is usually present in Broca's aphasia and less often in Wernicke's aphasia. Visual defect is commonly present in Wernicke's aphasia and rarely observed in Broca's aphasia.

⇨ Acquired aphasia usually develops after mid-life. The most probable cause is vascular lesion – cerebral thrombosis or embolism. In younger life the probable cause of aphasia is cerebral tumour/ abscess and occasionally in migraine.

b. Dysarthria:

This type of speech defect usually occurs due to the defect or lesion in the muscles of articulations of speech. Mainly 4 types of dysarthria are clinically observed – cerebellar, pseudobulbar, bulbar and cortical

- ☐ **Cerebellar:** Patient speaks slowly and deliberately, syllable by syllable, as if scanning a Shloka. This is staccato or scanning disturbance of speech rhythm. This is classical form of cerebellar dysarthria.
- ☐ **Pseudobulbar (spastic):** Individual syllables are slurred and precision of consonant pronunciation is lost, as in alcoholic intoxication. Thus,

British constitution becomes 'Brizh conshisushan'. This type of dysarthria is due to bilateral lesions in the corticospinal fibres supplying muscles of face, larynx, tongue and respiration i.e. supranuclear to brainstem nuclei. Hence the term pseudobulbar is used in this category. In this, jaw jerk is brisk and bilateral corticospinal tracts signs in the form of extensor plantar response are seen.

- ☐ **Bulbar:** Due to the lesions affecting speech muscles results in non-specific slurred speech. Dysphagia is usually present and fluids regurgitated through nose and person will be having difficulty in swallowing the solids.
- ☐ **Cortical dysarthria:** Due to the left temporal and frontal lesions, this is observed. It never occurs as isolated abnormality. Hesitancy in word production with difficulty in volitional movements of lips and tongue are seen.
  - ⇨ The syllables that test lips and jaw are --- pa, pa, ... ta, ta
  - ⇨ The syllables that test tip of the tongue are ---- sa, sa, sa
  - ⇨ The syllables that test body of the tongue are ---- ka, ka, ka etc
- ☐ The repetition rate is slowed in patients with dysarthria of any cause.

c. Dysphonia:

In this type of the lesion, the defect will be present in the vocal cords.

Cranial nerves: A systematic examination of the cranial nerves is essential in every neurological case. Not only may primary lesions of nerves, nuclei and their cerebral controlling centres be found, but secondary involvement of these by diseases of the brain and meninges gives most important localising data.

⇨ If there are signs of paralysis of muscles supplied by a cranial nerve, it is necessary to consider whether the lesion is situated in UMN or LMN – i.e. supranuclear or infranuclear.

1st cranial nerve: Olfactory nerve: These group of nerves are of not of great clinical importance. They are liable to damage by tumours or head injuries such as fracture of anterior cranial fossa, leading to unilateral anosmia (inability to perceive smell on one side); aura in epilepsy; mental disorders.

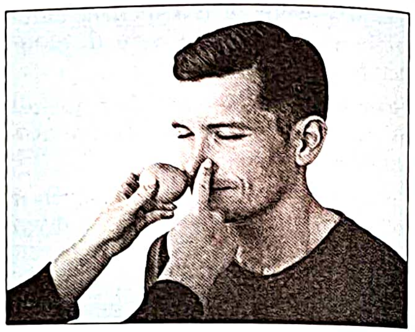


Fig 14.1: Examination of olfactory nerve

⇨ Ist cranial nerve is tested by substances which do not stimulate sensory endings of 5th cranial nerve. E.g. ammonia, acetic acid.

⇨ The substances used are peppermint, turpentine, oil of cloves, soap or coffee powder should be applied to each nostril in turn.

⇨ First the patient has to sit in a chair and he has to close his eyes. Then one nostril should be closed and the other nostril should be kept open. The clinician should ensure that the person not seeing anything. Then the substance which do not stimulate trigeminal nerve should be kept near one nostril and patient is asked regarding the nature of smell. If he is able to perceive then we can say that his 1st cranial nerve is functioning normally. Then it should be repeated in other nostril and procedure is repeated again.

⇨ While discussion of 1st cranial nerve dysfunction, following terms are being described. They are hyposmia, parosmia and cacosmia. The term hyposmia refers to the decreased faculty of smell which is usually seen in trauma to the forehead region. The term parosmia refers to the abnormal smell perception and cacosmia refers to the fetid smell happening due to the accumulation of pus in the lungs.

2nd cranial nerve: this is considered to be sensory nerve. It helps in the examination of optic nerve and its connections.

⇨ The optic nerve pathway: optic nerve optic chiasma lateral geniculate body optic radiations visual area in occipital lobe

⇨ Diseases where 2nd cranial nerve dysfunction can be seen are:

- ☐ Pituitary and other tumour
- ☐ Toxic exposure (methyl alcohol)
- ☐ Multiple sclerosis
- ☐ Tumour/ trauma
- ☐ Aneurysm
- ☐ Temporo sphenoidal abscess
- ☐ Middle cranial artery disease
- ☐ Posterior cranial artery disease
- ☐ Arterial spasm (migraine)
- ☐ Glaucoma
- ☐ Hypertensive retinopathy and diabetic retinopathy
- ☐ Optic neuritis

⇨ **Examination of optic nerve is done in three headings:**

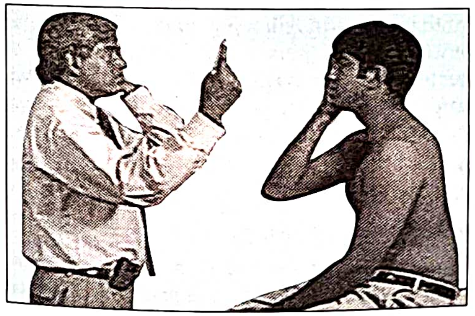


Fig 14.2: Confrontation test, examination of optic nerve

- ☐ Visual acuity test
- ☐ Ishihara chromatic plates
- ☐ Ophthalmoscopic examination
- ☐ Perimetry – Fields of vision
- ☐ Confrontation test: this is done in bedside.

3rd, 4th and 6th cranial nerve: These cranial nerves will supply muscles of orbit and extra ocular muscles. As far as the nerve supply of these nerves and muscles of eye are concerned, superior oblique muscle is supplied by 4th cranial nerve and lateral rectus is supplied by 6th cranial nerve and rest of the muscles of the eye and extra ocular muscles are supplied by 3rd cranial nerve.

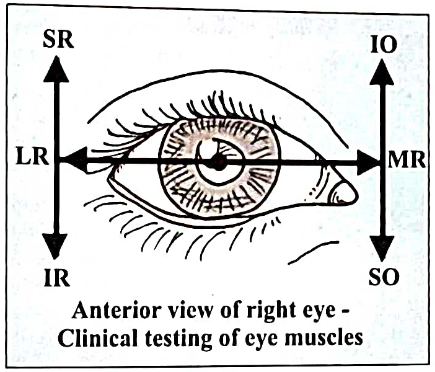


Fig 14.3: Movement of extra ocular muscles: examination of III, IV and VI cranial nerves

- ☐ Here, the patient is asked whether he sees double vision (diplopia), note should be taken of strabismus (squint), ptosis or nystagmus (oscillatory movement of the eyeball).
- ☐ **Condition of pupils observed–** whether equal in size and regular in outline, whether abnormally dilated or constricted and whether they react normally to light and accommodation.
- ☐ While testing the reaction to light patient should focus a distant point and ambient light should not be too bright. A light is then shown to each eye ensuring that

the light is not falling on other eye and pupil contracts. Sometimes, the pupil size slowly waxes and wanes as the light source remains constant. This is termed as 'hippus' that indicates intact Edinger Westphal nucleus (3rd cranial nerve).

- **Consensual reflex –** obtained by showing light to the one eye and noting the contraction of pupil in the other eye. Significance of this type of test is in the diagnosis of retro bulbar neuritis which is one of the earliest signs of disseminated sclerosis. If the afferent path of reflex arc for pupillary reactions is interrupted by retrobulbar neuritis, direct response to light will be lost. But efferent limbs of reflex arc (3rd cranial nerve nucleus) intact, when the light is shown to a normal eye, the other pupil will contract, though there is no direct response to light.
- In afferent path of the reflex arc is interrupted by an optic nerve lesion, the direct response to the light will be lost.
- In testing the reaction to accommodation, the patient is to look at the far wall of the room. The observer's finger is suddenly held vertically about 15 cm in front of the patient's nose and the patient is to look at the finger. As eyes converge, the pupils should contract equally as the patient accommodates for the finger and dilate as the finger moves away.
- To test the ocular movements, the patient's head is fixed and he must be asked to move the eyes.

⇨ **Common lesions:**

- Usually LMN lesions affecting the nuclei or nerves – trauma, meningeal infection, multiple sclerosis, local lesions within or behind the orbit.
- UMN lesions – cerebral haemorrhage, thrombosis in cortical or midbrain centres and transient and will produce paralysis of conjugate movement rather than individual muscles.
- Myasthenia gravis, ocular paresis, ptosis tend to be bilateral vary with time to time.

⇨ **III cranial nerve palsy:** If this is complete, then eye is immobile except it is moved by lateral rectus – i.e. cannot be moved upwards, downwards or inwards. The clinical features are

- External strabismus – implies intact VI cranial nerve
- Diplopia depending upon muscles involved will vary
- Ptosis – narrow palpebral fissure due to paresis of levator palpabrae superioris, there will be compensatory wrinkling of forehead due to overaction of frontalis muscle.
- Sometimes, portions of the nuclei are involved. This happens only in central lesions whereas peripheral lesions will cause complete palsy. E.g. palsy of superior rectus becomes apparent in abduction or look upwards.

⇨ IV cranial nerve palsy: On looking downwards, the patient complains of diplopia particularly when the eye is adducted. Isolated lesion of IV cranial nerve is rare.

⇨ VI cranial nerve palsy: unable to move eyeball outwards leading to internal strabismus with the presenting complaint of diplopia.

5th cranial nerve (trigeminal nerve): Trigeminal nerve has three divisions – ophthalmic, maxillary and mandibular divisions. This nerve supplies sensation of greater part of the face, forehead, parietal, temporal regions, nasal mucosa, buccal mucosa and conjunctival mucosa.

⇨ **Examination:** sensory and motor portions are tested.

⇨ **Sensory part of trigeminal nerve:**

- Sensation is tested by use of cotton wool and a pin over each area of face and buccal mucosa.

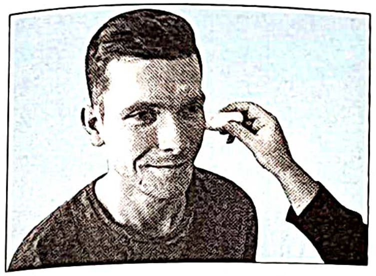


Fig 14.4: Examination of senosry part of trigeminal nerve, V cranial nerve

- **Corneal reflex:** loss of this reflex may precede other signs of V cranial nerve lesion.

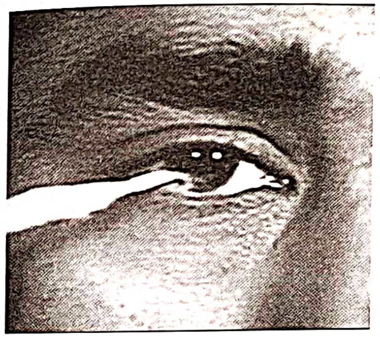


Fig 14.5: Examination of corneal reflex

- Corneal ulcers, dryness of nasal and buccal mucosa, anosmia and difficulty in chewing where paralysis of 5th cranial nerve is present

⇨ **Motor part of the trigeminal nerve:**

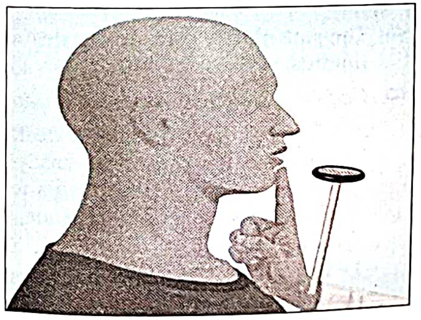


Fig 14.6: Elicitation of jaw jerk

- Position of teeth noted to see if there is any deviation of jaw
- Temporalis and masseter muscles are palpated while patient clenches teeth to assess any difference between strength of contraction
- Side to side movements (pterygoids) tested to move the jaw against resistance.
- In UMN lesion, paresis is rarely marked owing to bilateral innervation and the jaw jerk will be brisk.

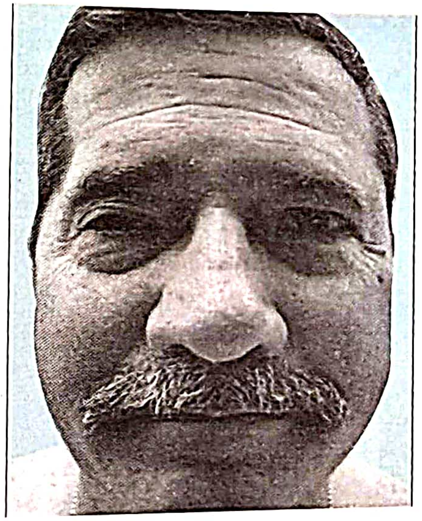


Fig 14.7: Image showing right trigeminal nerve indudced muscle atrophy

- Wasting of muscles is seen in LMN lesion

⇨ **Lesions:**

- Pontine lesions may involve 5th nerve nucleus produce pyramidal and other characteristic signs.
- Outside the pons, the nerve may be involved by tumours at the base of brain (cerebello pontine angle)
- Trigeminal neuralgia
- Ophthalmic herpes

7th cranial nerve (Facial nerve):

⇨ **Examination:** examination is designed primarily to test the movement of facial muscles.

- ☐ Wrinkling of forehead, close the eyes, puff out the cheeks, clench the teeth.
- ☐ Taste on each half of the tongue (anterior 2/3rd) should be tested, but loss of taste is determined by questioning.
- ☐ Any abnormal hearing acuity on affected side

⇨ **Causes:**

- ☐ UMN palsy – only affects muscles of lower part of face as occipito frontalis and orbicularis oculi are bilaterally innervated. This occurs due to vascular lesions of brain.
- ☐ LMN palsy – affect ½ of the face (Bell's palsy). This occurs due to inflammation of nerve within the facial canal, tumours of pons, cerebello pontine angle and trauma etc.

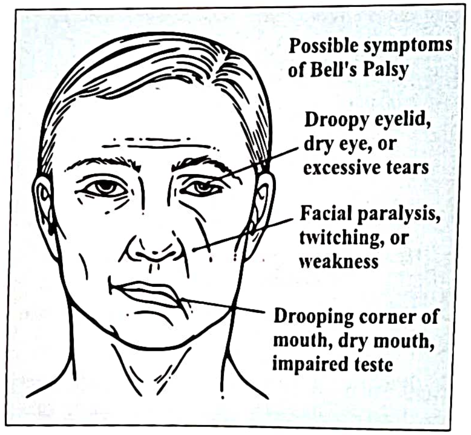

Possible symptoms of Bell's Palsy
Droopy eyelid, dry eye, or excessive tears
Facial paralysis, twitching, or weakness
Drooping corner of mouth, dry mouth, impaired teste

Fig 14.8: Image showing the examination of VII cranial nerve. Bell's palsy

⇨ **Clinical conditions of 7th cranial nerve palsy:**

- ☐ Tumours of pons or at cerebello pontine angle
- ☐ Trauma

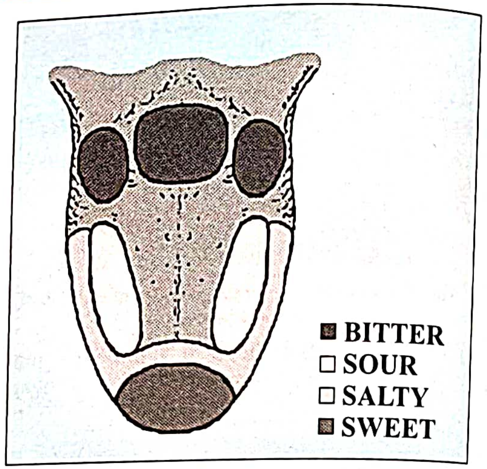


Fig 14.9: Image showing sensory part of VII cranial nerve

- ☐ Osteomyelitis of petrous part of temporal bone due to otitis media (middle ear infection)
- ☐ Parotid tumours affecting geniculate ganglion
- ☐ Herpes zoster affecting geniculate ganglion

8th cranial nerve (Vestibulo cochlear nerve): If there is lesion in this nerve connection, the following organs will have dysfunction.

1. The cochlea – the true organ of hearing
2. 3 semi circular canals constituting organ of dynamic equilibrium
3. Two otolith organs – utricle and saccule, organ of static equilibrium

⇨ The patient may complain of deafness, tinnitus, vertigo and nystagmus

⇨ Cochlear system: deafness and tinnitus

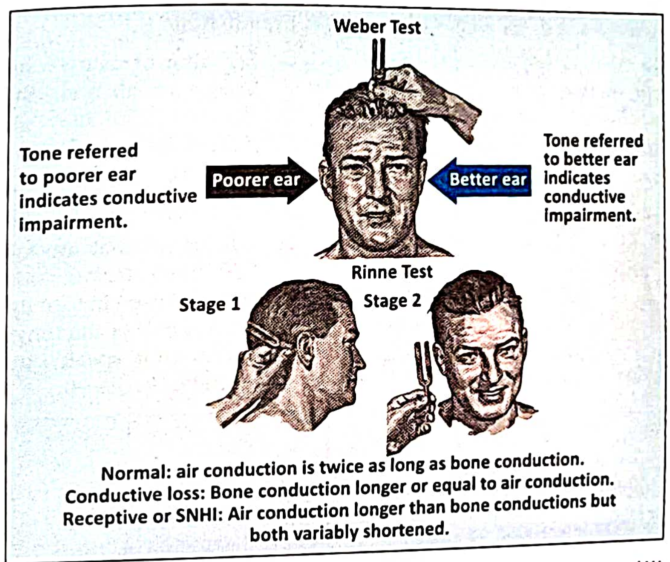
- ☐ Deafness: the existence of deafness (hearing loss) can be easily be established by testing the patient's ability to hear a watch or soft whisper.
- ☐ While doing the test, examination room should be devoid of distracting noise.

- ☐ Each ear should be tested separately.
- ● Spoken voice test
- ● Whispering voice test – soft whisper usually audible at about a distance of 3 feet.
- ☐ Tinnitus: precede deafness as a symptom of 8th cranial nerve disease. This is described as ringing, buzzing, hissing, singing or other form of noise in the ear.
- ● **Causes:**

⇨ Ischemia of auditory apparatus due to anemia

⇨ Atheroma or postural hypotension

⇨ High dose of salicylate and quinine


Weber Test
Tone referred to poorer ear indicates conductive impairment.
Poorer ear
Better ear
Tone referred to better ear indicates conductive impairment.
Rinne Test
Stage 1
Stage 2

Normal: air conduction is twice as long as bone conduction.
Conductive loss: Bone conduction longer or equal to air conduction.
Receptive or SNHI: Air conduction longer than bone conductions but both variably shortened.

Fig 14.10: Image showing examination of VIII cranial nerve by tuning fork, Rinne test and Weber's test

☐ **Tuning fork test:** used to differentiate conductive deafness and sensori neural deafness. Tuning fork of 256 Hz frequency is used. This is used to determine air conduction and bone conduction of the voice in the ears.

⇨ In air conduction (AC), the sound traverses the outer and middle ear and reach the organ of Corti.

⇨ In bone conduction (BC), the sound traverses skull bones to reach the organ of Corti.

⇨ In case of conduction deafness, AC (air conduction) is reduced, but no change in BC (bone conduction)

⇨ In case of sensori neural deafness, BC (bone conduction) and AC (air conduction) is reduced. In other words, if BC is normal, inner ear must be normal and if BC is reduced, then inner ear or central nervous pathways of hearing could be at fault.

⇨ **Schwabach test–** is the simplest of all. After striking the fork, it should be kept on the mastoid of the patient, till he hears the vibration. Then the fork should be kept on the examiner's mastoid process. If still the sound is heard, then it indicates that the patient is suffering from perceptive deafness.

⇨ **Rinne test–** Fork should be kept near external auditory meatus, later kept over the mastoid process. In case of conduction deafness, BC will be more than AC. In case of perceptive deafness, both BC and AC will be reduced.

- ⇨ **Weber's test–** A vibrating tuning fork is kept in the midline of the skull, the sound reaches both inner ears by BC. If inner ear is impaired, then the sound evoked also is impaired. In sensori neural deafness, the sound lateralises towards the sound side.
- ⇨ Limitation of the tuning fork test– this will give only qualitative information, no quantitative information can be obtained.
    - ❑ **Vestibular system:** examination for vertigo and nystagmus
- ⇨ **Vertigo–** vague sensation of dizziness or lightheadedness
- ⇨ **True labyrinthine vertigo–** involves sense of movement usually rotation in relation to environment. In severe form, vertigo associated with vomiting, pallor, sweating, inability to remain upright.
- ⇨ **Positional vertigo–** transient feeling of dizziness, when head is placed in certain positions, especially dorsiflexion. This is due to the disorder of labyrinth (utricle and saccule)
    - Nystagmus: uncontrollable pendular movement of eyes
    - Nystagmus arises from
- ⇨ Disturbance of visual function
- ⇨ Disturbance of labyrinthine function
- ⇨ Disturbance of CNS with involvement of central pathways
- ⇨ In congenital blindness, eyes oscillate aimlessly
- ⇨ **Miner's nystagmus–** associated with poor illumination
- ⇨ **Optokinetic nystagmus–** seen in railway passengers gazing at passing scenery
- ⇨ **Labyrinthine nystagmus–** occurs in 3 directions – horizontal, vertical, rotational
- ⇨ **Nystagmus of central origin–** cerebellar and vestibular lesion, pathways in pons and medulla; multiple sclerosis, brain tumour, and other lesions of cerebellum
- ⇨ Caloric test – irrigation of ear with hot and cold water

9th and 10th cranial nerve
(Glossopharyngeal nerve and vagus nerve)

- ⇨ **Examination:**
    - ❑ Sensation of taste is tested in suspected lesions of 7th and 9th cranial nerve. Anterior 2/3rd may show ageusia in 7th cranial nerve lesions and posterior 1/3rd may indicate 9th cranial nerve lesions.
    - ❑ Substances that are sweet, salt, sour and bitter (sugar, salt, vinegar and quinine) used in turn by placing a little on one half of the tongue. The patient should not speak but should write what he perceives.

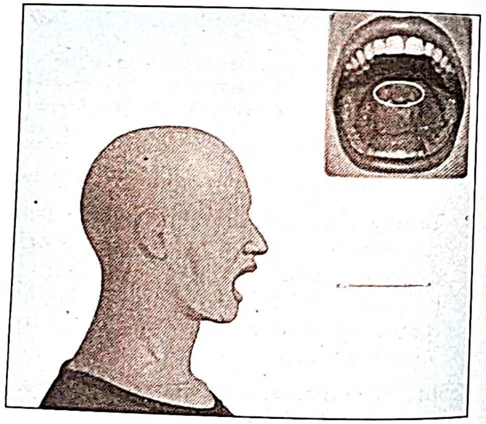


Fig 14.11: Image of pharyngeal (gag) reflex

- ❑ Test pharyngeal reflex by tickling each side of the pharynx with wooden spatula. Unilateral abolition of reflex results in organic lesions. Normally pharynx will move as a curtain towards a normal side. Bilateral abolition of pharyngeal reflex is seen in hysterical subjects.

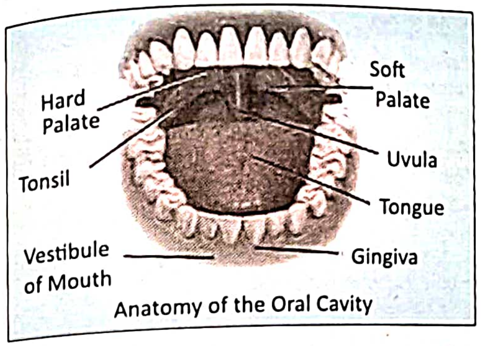


Fig 14.12: Image showing the anatomy of oral cavity

- ❑ Ask the patient to say 'Ah'. Normally uvula moves backwards in median plane. In 10th cranial nerve palsy, it is deflected to the normal side.
- ❑ Note difficulty in swallowing or speaking. In 10th cranial palsy, regurgitation of food through nose and a nasal voice occurs.
- ❑ Hoarseness of voice or aphonia may be present which need laryngoscopy. The left recurrent branch of vagus is damaged by mediastinal tumours which is due to abductor paralysis.

11th cranial nerve (Spinal accessory nerve)

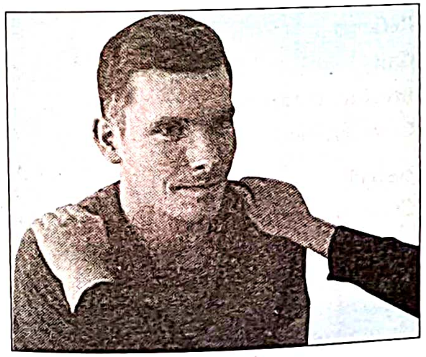


Fig 14.13: Examination of trapezium muscle, XI cranial nerve

- ⇨ **Examination:**
    - ❑ Ask the patient to shrug the shoulders (testing trapezius)
    - ❑ Ask the patient to move the neck away with resistance (testing sternocleidomastoid muscle)

12th cranial nerve (Hypoglossal nerve)

- ⇨ **Examination:**
    - ❑ The patient is asked to protrude the tongue
    - ❑ In LMN palsy, affected side is wasted and wrinkled and may show fasciculation

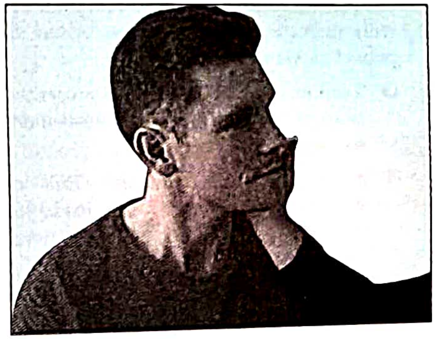


Fig 14.14: Examination of sternocleidomastoid muscle, XI cranial nerve

Tongue will be deviated to the affected side.

- ❑ The person may be presented with dysarthria
- ❑ In supra nuclear lesions of 12th cranial nerve, the tongue may be small and immobile, resulting in dysphagia and dysarthria.

Motor System

- ⇨ Description in brief about UMN and LMN, extrapyramidal system and cerebellum
- ⇨ Various symptoms at different sites of UMN:
- ⇨ **LMN:**
    - ❑ **Anterior horn cells–** muscle weakness

and fasciculation

- ☐ **Nerve roots–** muscle weakness
- ☐ **Peripheral nerve–** muscle weakness and sensory loss
- ☐ **Motor end plate–** myasthenia gravis

⇨ Extrapyramidal system: Basal ganglia located in fore and midbrain and include corpus striatum, substantia nigra and red nucleus. These receive impulse from cerebral cortex, thalamus and reticular formation and connect with anterior horn cells via striospinal, vestibulospinal, rubrospinal, tectospinal and reticulospinal tracts. These integrate components of skilled motor tasks – writing, walking etc. Lesions of extrapyramidal system interfere with delicate precision characterised in perfect movement.

- ☐ **Lesions of globus pallidus–** presented with increased duration of movement in contralateral limbs
- ☐ **Lesions of red nucleus–** loss of inhibition which in turn leads to involuntary movement of contralateral limbs
- ☐ **Lesions of cerebellum–** ataxia in the ipsilateral side (same side of the body and lesion)

Symptoms of motor system involvement

⇨ **Weakness–** decreased or loss of strength in one part of the limb or whole limb or two or three or all four limbs

⇨ **Stiffness–** due to corticospinal lesion; rigidity in extrapyramidal lesions, dysphagia and dysarthria may occur in extrapyramidal/ bilateral corticospinal lesion

⇨ **Unsteadiness** – in cerebellar dysfunction, the person will present with tendency of fall towards the side of the lesion

⇨ **Tremor** – rhythmic tremor action/intention tremor.

Table 14.3: showing the clinical difference between UMN and LMN lesions

UMN lesion	LMN lesion
Paralysis affect movements rather than muscles	Individual muscles or group of muscles affected
Wasting only from disuse therefore slight, occasionally marked in severe lesions	Wasting pronounced
Hypertonia Spasticity – clasp knife spasticity and rigidity – both cog wheel and lead pipe rigidity	Hypotonia of the muscles – flaccidity
Cyanosis and oedema may result from disuse, no gross trophic changes	Skin often cold, blue, shiny, ulceration may result
Exaggerated deep tendon reflexes, clonus is present	Diminished deep tendon reflexes
Superficial reflexes are diminished or modified e.g. abdominal reflexes, Babinski sign	No change in superficial reflexes
Associated movements sometimes present	No associated movements, fasciculation and myotactic irritability are present

Motor system is examined for

⇨ Movement and strength

⇨ Muscle bulk

⇨ Muscle tone

⇨ Reflexes

⇨ Gait

⇨ Involuntary movements

⇨ Co-ordination

Muscle bulk

⇨ Contour and size of the muscles are noted

⇨ **Atrophy–** LMN lesions, myopathies, measuring tape is used to determine the bulk of the muscles. For accuracy, the circumference should be measured and compared with normal side

⇨ **Hypertrophy** – more difficult to recognise.

It may result from increased occupational use of certain group of muscles. For example, in pseudomuscular hypertrophy, great calves and buttocks stand out in marked contrast.

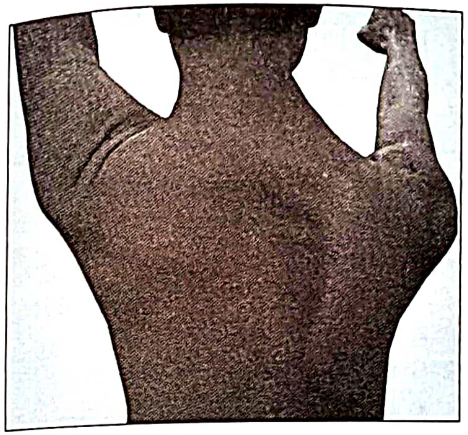


Fig 14.15: Image showing winging of scapula due to atrophy of serratus anterior muscle

Muscle power

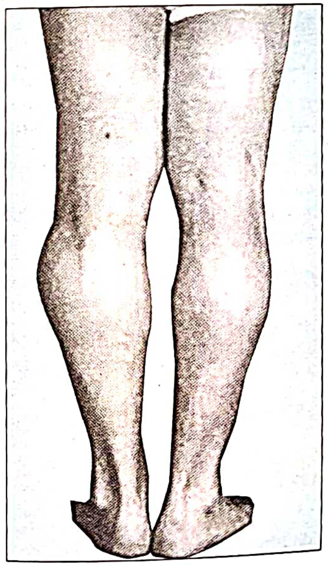


Fig 14.16: Image showing pseudohypertrophy of calf muscles in Muscular dystrophy

⇨ Muscle weakness may be suggested by lack of spontaneous movement in the affected part when patient walks into the room.

⇨ At each important joint, the action of flexors, extensors, abductors, adductors, pronators and supinators etc must be tested without any load and then with resistance and compared with other side. Movement of head and trunk also tested.

⇨ MRC classification of muscle power:

- ☐ 0 – Total paralysis
- ☐ 1 – Flicker of contraction
- ☐ 2 – movement with gravity eliminated
- ☐ 3 – movement against gravity
- ☐ 4 – movement against resistance but incomplete
- ☐ 5 – normal power

Tone of muscles

⇨ Muscle tone is said to be state of the contraction of the muscles in resting state or during motion. Not all joints need to be assessed, flexion and extension of elbows and knees and pronation and supination of forearm are suitable for screening purposes.

⇨ Hypertonia: Increased resistance of the muscles observed in case of UMN lesions and extrapyramidal lesions. These are of two types: spasticity and rigidity

- ☐ **Spasticity:** this is the state of hypertonia observed for a certain time period during the movement of the limb. This is not seen throughout the movement of the limb. This is seen in cerebro vascular accident. Spasticity is maximum in flexors of arms and extensors of legs.
- ☐ **Rigidity:** this is the state of the hypertonia observed throughout the movement of the limb. This is again of two types – cog wheel rigidity and lead pipe rigidity. This is seen in extrapyramidal lesion

such as parkinsonism. The term cog wheel rigidity means the movement diminishes in jerky steps due to tremor as well as rigidity. Lead pipe rigidity is rigidity without tremor. Cog wheel rigidity is seen in upper limb and lead pipe rigidity is seen in lower limb. Extrapyramidal rigidity is often greater in the head, neck and shoulder than in the limbs.

⇨ **Hypotonia:** Decreased resistance of the muscles observed in the limbs during the movement of the limbs. This occurs in LMN lesions and cerebellar lesions. Here passive movement is unduly free often through a greater range than normal.

Reflexes: Reflex action is an immediate motor or secretory response to an afferent impulse.

⇨ **Clinical types:**

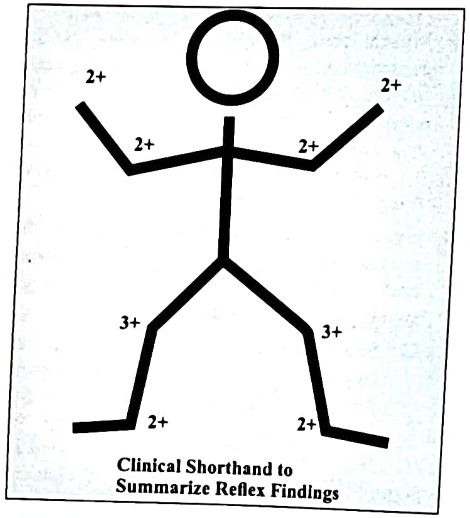


Fig 14.17: Schematic representation of reflexes and grading in different parts of the body

1. Deep tendon reflexes
2. Superficial/ skin reflexes
3. Organic/ visceral reflexes

⇨ The clinical importance of reflexes depends partly on their localising value and partly on the information about integrity of neurons – sensory, motor which form the reflex arc.

⇨ **Diminished reflexes:**

1. In injury or disease
2. May be interrupted in sensory part, motor part or in limb/ spinal cord
3. Peripheral neuropathy and root lesions
4. Myopathies
5. Bilateral side in coma

⇨ **Increased reflexes:**

1. UMN lesions
2. Extrapyramidal lesions

⇨ **Grading of the reflexes:**

1. 0 – Absent even with reinforcement
2. +- - Present only with reinforcement
3. + - Just present
4. ++ - Normal reflex
5. +++ - Exaggerated reflexes
6. ++++ - Clonus present in UMN lesion

Table 14.4: showing segmental level of different reflexes

Deep reflexes	Superficial reflexes
Ankle reflex – S1, S2	Plantar reflex – S1, S2
Knee jerk – L3, L4	Abdominal reflex – T7-T11
Biceps jerk – C5, C6	Cremasteric reflex – L1
Triceps jerk – C7, C8	
Radial jerk – C6	
Jaw jerk – pons	

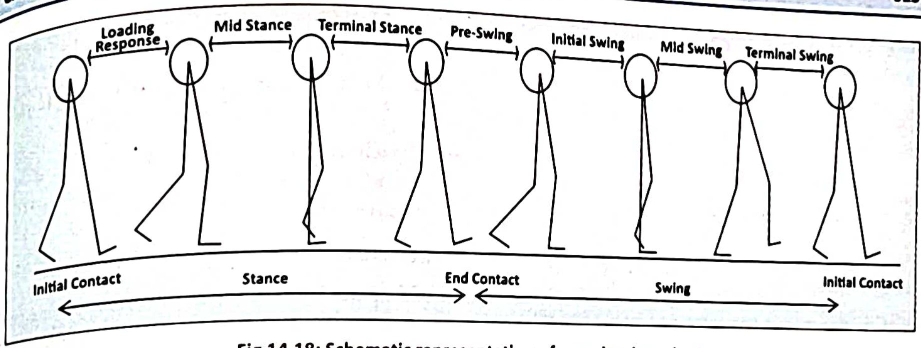


Fig 14.18: Schematic representation of examination of gait

Patient should be asked to walk across the floor with legs uncovered and unhampered by clothes

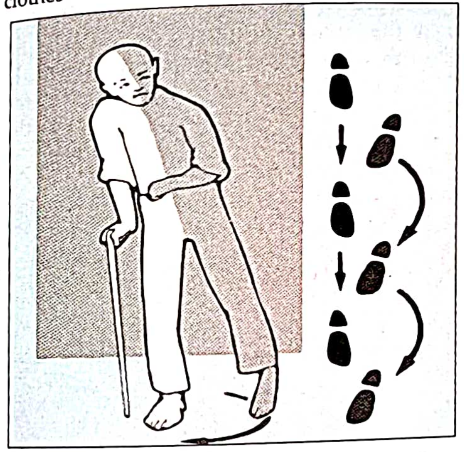


Fig 14.19: Image of hemiplegic or circumduction gait

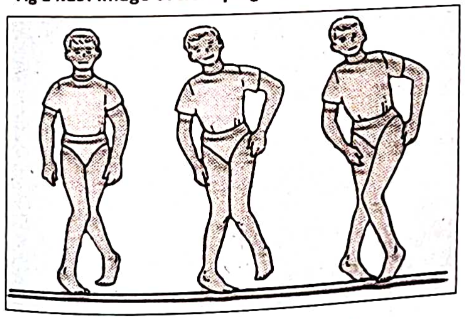


Fig 14.20: Image of scissors gait

⇨ **Scissor's gait**– observed in children in patients of Little's disease

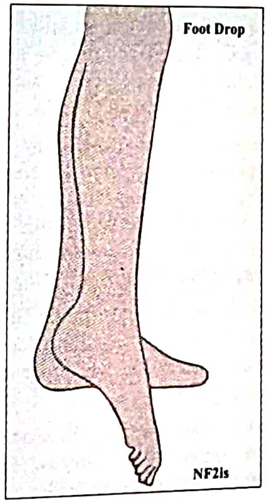


Fig 14.21: Image of high stepping gait

⇨ **High stepping gait**– common peroneal nerve palsy

⇨ **Short suffling gait** – in parkinsonism

⇨ **Ataxic gait** – cerebellar ataxia

⇨ **Limping gait** – IVDP

⇨ **Waddling gait** – pregnancy, Duchenne muscular dystrophy

Involuntary movement: These movements are observed in either limbs or in the trunk or in the head and neck and the person is not having any control on this. When one notices the involuntary movement, then exact distribution and type of the involuntary movement must be recorded. The following are the different names of involuntary movements given based on specific pattern.

- ⇨ Chorea
- ⇨ Athetosis
- ⇨ Hemiballismus
- ⇨ Tics and habit spasms
- ⇨ Tremors
- ⇨ Myoclonus

⇨ **Chorea**–repetitive, jerky movements which are irregular, spontaneous, purposeless and may occur anywhere in the body, precipitated by emotion and voluntary effort and disappears during sleep. E.g. rheumatic chorea and Huntington's chorea, lesions of basal ganglia

⇨ **Athetosis**– peculiar, slow snake charming movements seen chiefly affecting wrists and fingers. Flexion and extension are the movements observed in this type. E.g. hemiplegia of long duration due to lesion of extrapyramidal system.

⇨ **Hemiballismus**– a swinging movement of violent nature of arm and leg of great amplitude at shoulder and hip, but affected limbs are flaccid.

⇨ **Tics and habit spasms**– these are difficult to distinguish from chorea. Here, the movements are purposive. Some are simple such as shrugging shoulders, blinking eyes and some are complex such as frequent uncontrollable repetition of same word or sentence. These movements may go on for much longer duration than chorea i.e. months without much variation in intensity.

⇨ **Tremors**– these may occur due to metabolic derangement, alcoholism. Tremors of neurologic origin are of 2 kinds – static and action.

❑ **Static tremor**– relatively independent of movement. E.g. 3-5/second course tremor of parkinsonism. First affects index and thumb of one hand, followed by flexion-extension of wrist followed by pronation- supination of forearm.

❑ **Action tremor (intention tremor)**– this is observed in cerebellar lesion

⇨ **Myoclonus**– a rare type consists of sudden shock like contraction producing recurring muscle jerks

Co-ordination

⇨ **Of upper limb**– Finger nose test with eyes (open and closed) – patient is asked to fully extend and abduct the arm and then touch the tip of his nose with the forefinger, the hand being in the mid-prone position as the index finger reaches the nose. The test is repeated with the eyes closed. Observe if the finger accurately touches the tip of the nose and if there is any tremor. In case of ipsilateral cerebellar lesion (on the same of the affected part of the body), the person will be having the disturbance of coordination.

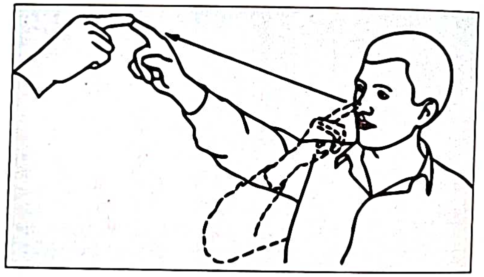


Fig 14.22: Image of finger nose test for coordination of upper limb

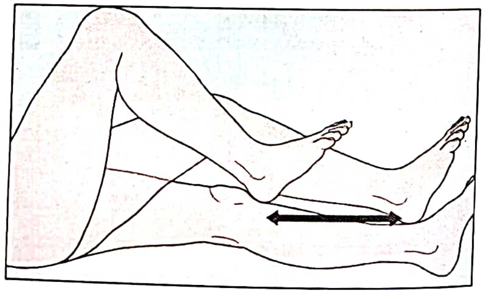


Fig 14.23: Image of heel shin test for coordination test of lower limb

⇨ **Of lower limb**–heel knee test e.g. cerebellar lesions – patient is asked to touch his knee with the heel of the other leg, and then slide the heel down the shin an dorsum towards the big toe, without permitting the heel to slide off the leg. The foot should not be rubbed up and down the shin. In case of ipsilateral cerebellar lesion, this coordination movement is affected.

⇨ **Dysdiadokokinesia** – this is the ability to carry out rapid alternating movements. On each side, this test is performed. In cerebellar disease, this movement is carried out slowly and somewhat irregularly or clumsily. Other test for the same phenomenon include a rapid opening and closing of the fist, repeated tapping of the foot on the floor, touching the tip of each finger to the thumb.

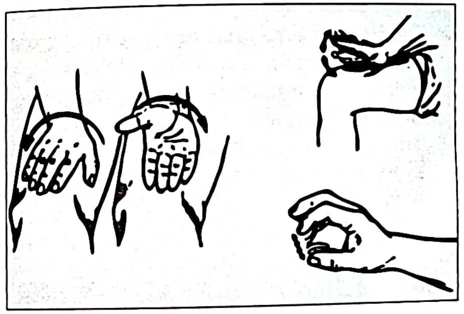


Fig 14.24: Image of test of dysdiadokokinesia for coordination test

Sensory System

⇨ The path taken by different types of sensation is of great importance in clinical neurology. 2 types of relay systems for sensory information are important clinically – lemniscal and spinothalamic

(a) **Lemniscal** – concerned with transmission of proprioceptive and well localised touch, joint position, 2 point discrimination, vibration sense use this pathway. These myelinated fibres enter the dorsal horn of spinal cord and without synapsing, pass up spinal (posterior) columns to gracile and cuneate nuclei in medulla oblongata. In this area, they synapse, and 2nd order neurons cross midline ascend the brainstem in medial lemniscus and thence to thalamus.

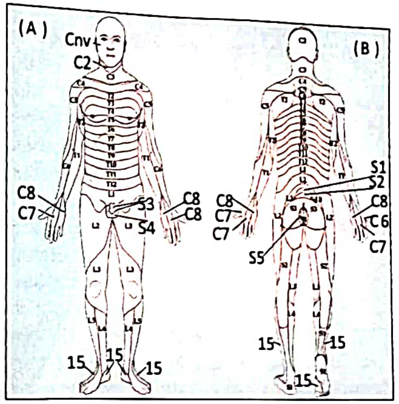


Fig 14.25: Image of dermatome level of spinal nerve for sensory system examination

❑ **Spinothalamic tract**– pathway for pain, temperature and poorly localised touch. These unmyelinated, smaller, slow conducting fibres enter the spinal cord in the dorsal root and synapse in the dorsal horn. 2nd order neurons cross midline over the distance of several segments and ascent in contralateral spinothalamic tract, joining medial lemniscus thence to thalamus.

❑ **Both** pathways synapse in ventro-posterio-lateral nucleus of thalamus.

⇨ **Sensory symptoms:** pain and parasthesiae in the form of pins and needles, pricking and numbness

❑ **Paraesthesia**– in multiple sclerosis and spinal tumour

❑ Pain

⇨ **Peripheral nerve pain**– injury, neuritis, neuropathy

⇨ **Root pain** – aggrevated by coughing and sneezing, spondylosis with disc protrusion and meningeal tumours

- ⇨ **Causalgia** – burning pain occurring after limb injuries in cases where the nerve damage is slight.
- ⇨ **Visceral pain** – poorly localised

☐ **Sensory system examination:** the examination is important to localise the site of the lesion. It is most difficult part of whole nervous system examination because it depends solely on the description given by the patient and it cannot be measured objectively and thus this type of examination cannot be standardised. Therefore, when one performs the sensory system examination, the patient should be properly educated about the exact nature of the test to be performed and what the patient should supposed to do during the course of examination. If the clinician performs the examination carefully depending upon the pattern and quality of sensory disturbances, exact site of the lesion can be identified – whether of peripheral nerve, sensory roots, spinal cord, thalamus, sensory cortex or parietal cortex etc. The following are the examinations to be done in case of sensory system affliction.

☐ While performing the sensory system examination, the patient has to close his/ her eyes and

- ⇨ Tactile sensation
- ⇨ Discrimination
- ⇨ Deep sensibility
- ⇨ Perception of pain and temperature
- ⇨ Joint and vibration sense
- ⇨ Stereognosis
- ⇨ Tactile sensation: best tested by gently touching the skin with a wisp of cotton wool or mere touch with finger tip, make sure that the patient's eyes should be closed. Immediately after the touch, the patient has to say yes after feeling the touch. It is customary to start with face and go down the body and comparing the symmetrical areas on either side. One has to look for anaesthesia, hyperaesthesia and paraesthesia.

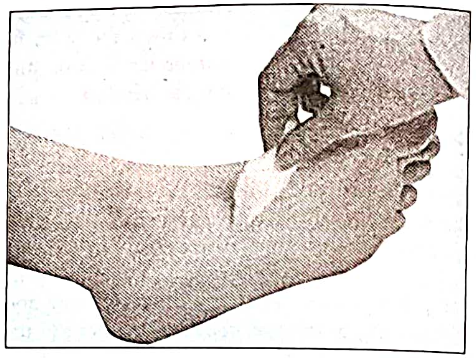


Fig 14.26: Image of examination of skin for light touch in sensory system examination

- ⇨ **Tactile discrimination (two point discrimination):** tested by determining at what distance apart, two points of compass can be identified. This varies greatly in different parts of the body. E.g. a few mm in tongue and nose and several inches in lower back.

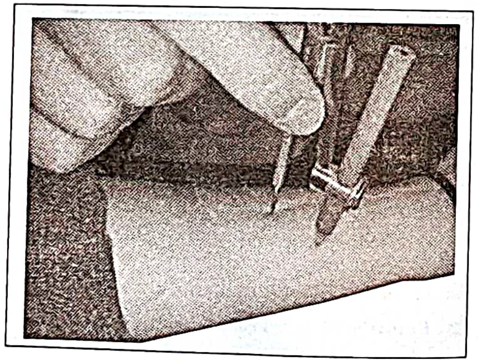


Fig 14.27: Image of two point discrimination in sensory system examination

- ⇨ **Deep sensibility:** tested by firm pressure with blunt object such as pencil or pinching the muscle of forearm, thigh, calf or Achilles tendon. Testicular pressure can also be tried.
- ⇨ Pain: tested by pricking with a pin but heavy pressure should be avoided. To control the degree of the prick, it is advisable to hold the pin in such a way that its point just extends beyond the tip of examiner's middle finger.

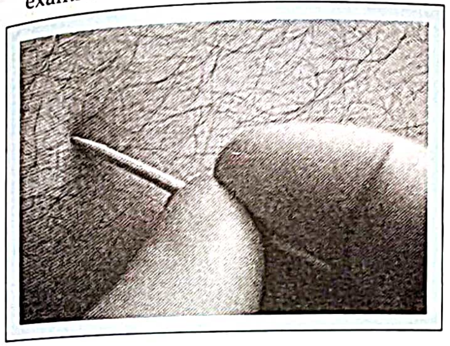


Fig 14.28: Image of pain sensation in sensory system examination

- ⇨ **Temperature discrimination:** two test tubes made of either copper or steel containing cold and warm water should be used to test this parameter. For accurate comparison, only symmetrical areas of the skin should be tested, because the uncovered parts of the body such as distal parts of the limbs, are less sensitive to cold than covered parts.

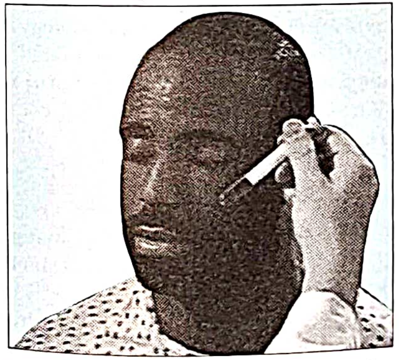


Fig 14.29: Image of examination of temperature sensation in sensory system examination

- ⇨ **Joint position sense:** Before performing this type of examination, patient has to be given appropriate instructions what [illegible] expect in the movement of the joint. What is meant by up and down of the movement of the joint. Usually big toe and index finger is preferred for testing this type of examination. Joint is moved passively and patient is asked regarding the position of the joint. It is an indicator for the disease of posterior roots.

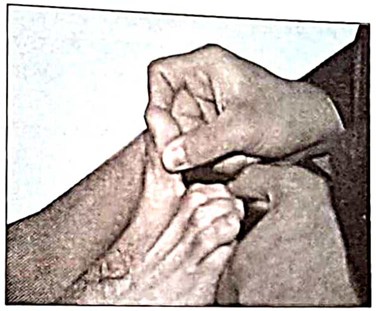


Fig 14.30: Image of joint position sense in sensory system examination

- ⇨ **Vibration sense:** tested by tuning fork of 128 Hz frequency over superficial bones. This is of importance in case of posterior column diseases. Bony prominent areas are tested such as sternum, shoulder, clavicle, anterior superior iliac spine, tibial tuberosity etc. impairment or loss of perception of vibration is suggestive of disease of posterior column, roots, peripheral nerve or parietal lobe. Vibration sense is normally impaired in old age.

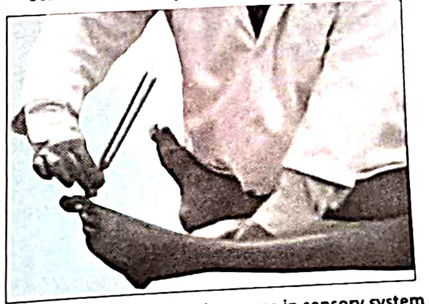


Fig 14.31: Image of vibration sense in sensory system examination

- ⇨ **Stereognosis:** Normally a person with closed eyes, can be in a position to recognise the object placed in the hand by its feel. In this examination, the patient is asked to close his eyes and asked to identify known objects – key, coin etc which will be placed in each hand and he is asked to name each. If the person is unable to name it, he should say the object in terms of shape, size and texture. Make sure that one should not key bunches which can produce the sound by which it can give a clue to the patient regarding the object which is being kept on the patient's hand.

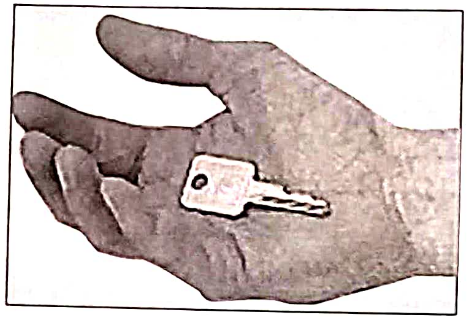


Fig 14.32: Image of stereognosis in sensory system examination

Diagnosis of neurological disease

- **Anatomical diagnosis** – diagnosis may often be achieved with more precision in nervous system disorders/ diseases than in other parts of the body. The reason for this is that disturbances of function are closely related with anatomical site of the lesion.
- **Location of lesion in spinal cord compression:**

Table 14.5: showing localisation of spinal cord compression and clinical presentation

Location of lesion	Signs of cord compression
Cervical above C5	UMN signs and sensory loss in all four limbs
C5 to T1	LMN signs + segmental sensory loss in arms + UMN signs in lower limbs
Thoracic region	Spastic paraplegia with sensory level on trunk
Conus medullaris	Loss of sensation in sacral area + extensor plantar response
Cauda equina	LMN signs in the lower limbs

- **Brown Sequard syndrome:**
  - ☐ Contralateral loss of pain and thermal sensibility below the lesion
  - ☐ Ipsilateral with spastis paralysis, disturbance of sense of position and of movement and loss of recognition of weight, size, shape, touch and vibration
- Damage to the motor system in the brain may result in characteristic patterns as in complete hemiplegia of internal capsule lesion
- Special functions of other parts of the brain may be lost/altered and cause impairment of intellect, memory and personality when frontal lobes are affected.
- Involvement of cranial nerves may have great localising value if associated with other neurological signs, but not if nerve alone is involved because of long course of certain cranial nerves.

Aetiological diagnosis

- This has a close bearing on the anatomical diagnosis for it is known that certain types of pathological diagnosis repeatedly occur in the same site. For example, virus of poliomyelitis afflicts anterior horn cells and virus of herpes zoster afflict posterior nerve root.
- Time relationships are closely bound with etiology. E.g. trauma can cause instantaneous effect. Inflammatory lesions develop in a matter of days; neoplastic lesions take weeks or months and degenerative processes require months to years before revealing diagnostic picture.

Chapter Resources

1. Physical diagnosis – a textbook of symptoms and physical signs by Rustam Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
2. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie & Christopher C Evan, 12th Edition, Butterworth Heinmann publications, New Delhi, 1997
3. A manual of clinical surgery by S Das, 4th Edition, Published by Dr S Das, Calcutta, 1998
4. Savill's system of clinical medicine revised & edited by E C Warner, 14th Edition, CBS Publishers, Delhi, 1998
5. The Merck's Manual by Robert S Porter & Justin L Kaplan, 19th Edition, Merck Sharp & Dohme Corp, 2011
6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

Key points of the chapter

- Evaluation of neurological evaluation is very easy provided one should have a idea of neuroanatomy and physiology in brief and basics of examination of neurological patient. All efforts are focused on two factors – where the lesion is and what the lesion is.
- Sequence of neurological examination is 1. Higher mental functions; 2. Speech; 3. Cranial nerve examination; 4. Motor system examination and 5. Sensory system examination.
- Higher mental functions include the assessment of handedness, consciousness, mini mental status examination, memory
- Speech examination include the examination of dysphasia (site of the lesion in brain), dysarthria (site at the muscles which lead to production of speech) and dysphonia (site of the lesion is vocal cords).
- Cranial nerve examination helps in localizing the lesion. 1st and 2nd cranial nerve origin in forebrain; 3rd and 4th cranial nerves originate in midbrain; 5th, 6th, 7th and 8th cranial nerves originate in pons and 9th, 10th, 11th and 12th cranial nerves originate in medulla oblongata.
- Motor system examination helps in determining UMN and LMN lesions. The examination of motor system include muscle bulk, muscle power, muscle tone, reflexes, gait, assessment of involuntary movements if present, co-ordination between movements
- Sensory system examination is the most difficult part of neurological examination as we have to rely on patient's words for the whole sensory system examination. It includes touch, pain, deep pressure, joint position, vibration, stereognosis, two point discrimination.

Probable questions may be asked in the examination

MCQs

1. **Clonus is categorized under**
   a. Higher mental function;
   b. Cranial nerve examination;
   c. Motor system examination;
   d. Sensory system examination
   Answer -(c)
2. **Find the one which does not belong to the group.**
   a. Hypertonia;
   b. Flaccidity;
   c. Clonus;
   d. Spasticity
   Answer -(b)
3. **Which of the following is not a LMN sign?**
   a. Fasciculation;
   b. Rigidity;
   c. Hyperreflexia;
   d. Spasticity
   Answer -(a)
4. **67 years old patient presented with features of cerebro vascular accident associated with speech disturbances. This speech defect can be considered as**
   a. Dysphasia;
   b. Dysarthria;
   c. Dysphonia;
   d. None of the above
   Answer -(a)
5. **In EMV score, the term E refers to**
   a. Eye movements;
   b. Ear response;
   c. Encephalon response;
   d. Eating habits
   Answer -(a)
6. **The best EMV score is**
   a. 3;
   b. 10;
   c. 15;
   d. 20
   Answer -(c)
7. **Bell's phenomenon is the sign seen in which of the following cranial nerve dysfunction?**
   a. Abducens;
   b. Oculomotor;
   c. Optic;
   d. Facial
   Answer -(d)
8. **Bell's phenomenon is seen in which part of the body?**
   a. Ear;
   b. Eye;
   c. Tongue;
   d. Nose
   Answer -(b)
9. **Two point discrimination test is**
   a. Motor system examination;
   b. Sensory system examination;
   c. Cranial nerve examination;
   d. Higher mental function
   Answer -(b)
10. **Intention tremor is the sign seen in**
   a. Parkinson's disease;
   b. Cerebellar tumour;
   c. Lesion of globus pallidus;
   d. Lesion of putamen
   Answer -(b)

***

Integumentary System

15

Examination of integumentary system poses a great challenge in determining the normal from abnormal findings from trivial ones and in integrating pertinent signs and symptoms to appropriate differential diagnosis. To make the appropriate dermatological diagnosis, one should know the different terminologies in primary and secondary lesions.

Dermatological history taking

- **Medical history and medication:-** a general medical history may be important in determining the cause of some disorders because the symptoms several multi-organ diseases first appear on the skin. Situations in which systemic disease should be considered include unusual patterns of ulceration such as systemic lupus erythematosus and acquired ichtyosis or gerenalised pruritus without rash in younger patients (scabies). Medications may cause skin eruptions. For example, administration of penicillin induce skin eruptions etc.
- **Family history:** may be important in diseases such as atopic dermatitis, psoriasis and in some non inherited diseases where in family contact is of importance such as scabies or leprosy)
- **Occupation and hobbies** – hands are most often afflicted part in case of dermatological illness as far as occupation of an individual is concerned such as contact dermatitis due to soap or detergent etc. Rubber chemicals (footwear or gloves) resulting in irritating lesions in the foot or hands, allergic skin reactions in case of gardening in the person having the occupation of gardener.
- **Environmental and social factors** - both physical and psychological, may be in house or at work, may have an impact on skin.
- History of self medication or history of any other medicines is also of much importance.

Physical examination

- In the examination of the skin, the patient should be assessed prior to the detailed clinical history. The observed clinical findings should be integrated to the relevant historical information.
- Skin examination is one of the easiest examination to be performed and can be performed without the need for complex investigations, although a biopsy may be needed to confirm the diagnosis.
- An ideal skin examination includes evaluation of skin, hair, nails and mucosal surfaces of mouth, eyes, nose, nasopharynx and anogenital region. During the initial examination of the patient, it is important that the patient is disrobed as completely as possible. This will minimise the chance of missing the important individual skin lesion. The patient should be first viewed from a distance of 1.5-2 m (4-6 feet) so that general character of the skin and distribution of the lesions can be evaluated.
- Skin lesions sometimes indicate a serious internal disease. For example, the girl in the photograph presented to you with skin rash over the face, made worse on exposure to sunlight. She also complains of lassitude, weight loss and vague musculo skeletal symptoms, the probable diagnosis could be systemic lupus erythematosus (SLE).

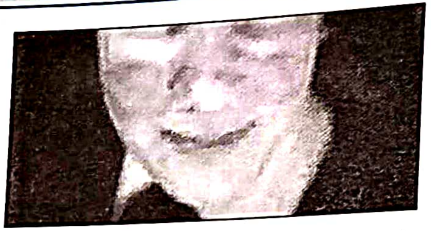


Fig 15.1: Image showing the butterfly rashes around the cheeks seen in the patient of SLE

- ⇨ If the person is presented with skin lesion localised to one particular part of the body, usually the cause of the skin lesion is usually exogenous and if the person is presented with generalised skin lesions usually the cause of the skin lesion is endogenous. If the person is having linear skin lesion, usually the cause of the lesion is either surgical or use of sharp instrument like knife can be predicted. If the person is having the skin lesion with irregular surface, probable cause of the lesion could be exogenous such as road traffic accident or sports injury.
- ⇨ Four basic features of skin lesion must be noted and considered during the physical examination.
  - ☐ **Distribution of the eruption–** which part of the body is afflicted? Among the integumentary system, whether nail or hairs or skin or mucosa afflicted? These informations should be analysed.
  - ☐ **Types of primary and secondary lesions–** one should have the thorough knowledge of primary and secondary lesions and their distribution in the body should be properly analysed. Each dermatological illness is usually having typical primary and secondary lesions in specific location of the body.
  - ☐ **Shape of individual lesions–** it should be analysed so that diagnosis of the dermatological illness can be accurately made. For example, the presence of wheal in the body suggests the allergic dermatitis.
  - ☐ **Arrangement of the lesions–** arrangement of the lesion in the different parts of the body will also aid in the diagnosis of the disease.

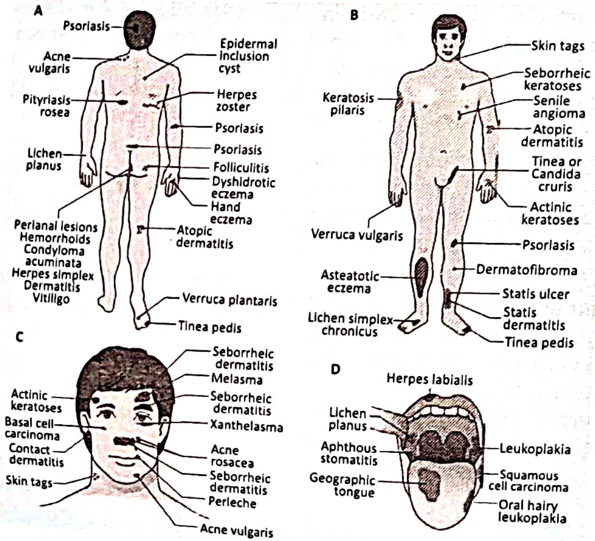

A
Psoriasis
Acne vulgaris
Epidermal inclusion cyst
Pityriasis rosea
Herpes zoster
Psoriasis
Lichen planus
Psoriasis
Folliculitis
Dyshidrotic eczema
Hand eczema
Perianal lesions
Hemorrhoids
Condyloma acuminata
Herpes simplex
Dermatitis
Vitiligo
Atopic dermatitis
Verruca plantaris
Tinea pedis
B
Skin tags
Seborrheic keratoses
Keratosis pilaris
Senile angioma
Atopic dermatitis
Tinea or Candida cruris
Actinic keratoses
Verruca vulgaris
Psoriasis
Asteatotic eczema
Dermatofibroma
Statis ulcer
Lichen simplex chronicus
Statis dermatitis
Tinea pedis
C
Seborrheic dermatitis
Melasma
Actinic keratoses
Seborrheic dermatitis
Basal cell carcinoma
Xanthelasma
Contact dermatitis
Acne rosacea
Skin tags
Seborrheic dermatitis
Perleche
Acne vulgaris
D
Herpes labialis
Lichen planus
Aphthous stomatitis
Leukoplakia
Geographic tongue
Squamous cell carcinoma
Oral hairy leukoplakia

Fig 15.2: Distribution of nature of skin lesions in different parts of the body in various skin diseases

Table 15.1: showing the different primary lesions and their descriptions

Macule	A flat coloured lesion, < 2 cm in diameter, not raised above the skin surface of surrounding skin.
Papule	A small solid lesion, <0.5 cm in diameter, raised above the skin surface of the surrounding skin. This differs from macule only in size.
Vesicle	A small, fluid filled lesion, <0.5 cm in diameter, raise above the plane of surrounding skin. Fluid is often visible, and the lesions are translucent (e.g. vesicles in allergic contact dermatitis
Pustule	A vesicle filled with leukocytes. The presence of pustules does not necessarily signify the existence of infection
Nodule	A larger (0.5-5 cm), firm lesion raised above the surface of the surrounding skin. This differs from papule only in size (e.g. dermal nevomelanocytic nevus)
Patch	A large (> 2 cm) flat lesion with a colour different from the surrounding skin and palpable (e.g. a closed comedone or whitehead in acne)
Tumour	A solid, raised growth > 5 cm in diameter
Plaque	A large (> 1cm), flat topped, raised lesion, edges may either be distinct (e.g. psoriasis) or gradually blend with surrounding skin (e.g. in eczematous dermatitis)
Bulla	A fluid filled, raised, often translucent lesion >0.5 cm in diameter
Wheal	A raised, erythematous, oedematous papule or plaque, usually representing short lived vaso dilatation and vaso permeability
Telangiectasia	A dilated, superficial blood vessel

Table 15.2: showing different secondary lesions and their descriptions

Lichenification	A distinct thickening of the skin that is characterised by accentuated skin fold marking
Scale	Excessive accumulation of stratum corneum
Crust	Dried exudate of body fluids that may be either yellow (serous crust) or red (hemorrhagic crust)
Erosion	Loss of epidermis without an associated loss of dermis
Ulcer	Loss of epidermis and at least a portion of the underlying dermis
Excoriation	Linear, angular erosions that may be covered by crust and are caused by scratching
Atrophy	An acquired loss of substance. In the skin, this may appear as depression with intact epidermis or as sites of shiny, delicate, wrinkled lesions
Scars	A change in the skin secondary to trauma or inflammation. Sites may be erythematous, hypopigmented or hyperpigmented depending upon their age or character. Sites on hair bearing areas may be characterised by destruction of hair follicles.

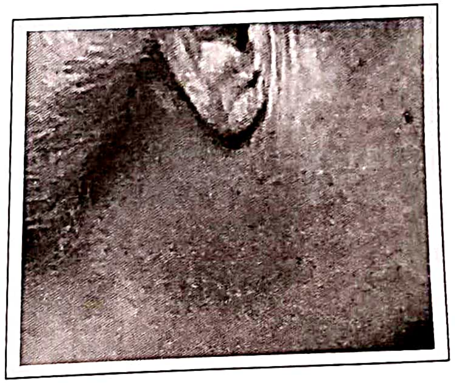


Fig 15.3: Image of macule, primary lesion

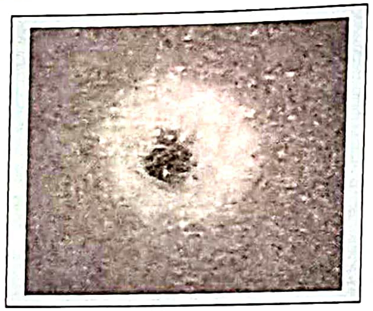


Fig 15.4: Image of papule, primary lesion

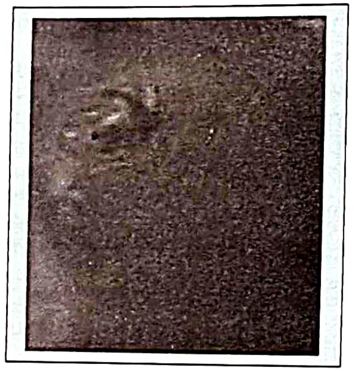


Fig 15.5: Image of pustule, primary lesion

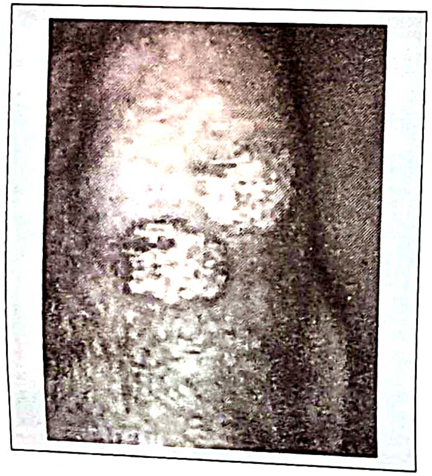


Fig 15.6: Image of plaque, primary lesion

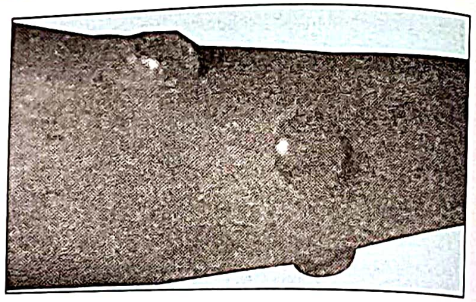


Fig 15.7: Image of bulla, primary lesion

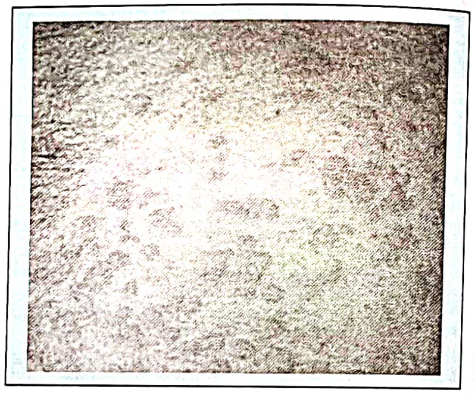


Fig 15.8: Image of wheal, primary lesion

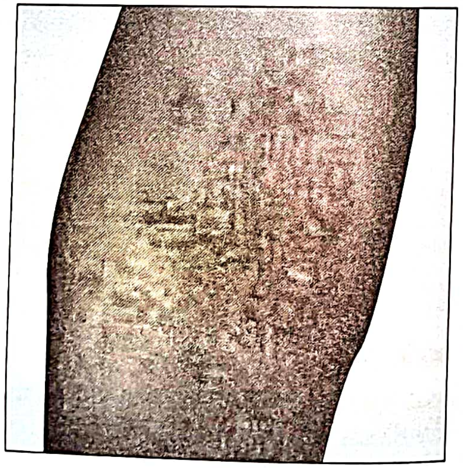


Fig 15.9:Image of lichenification, secondary lesion

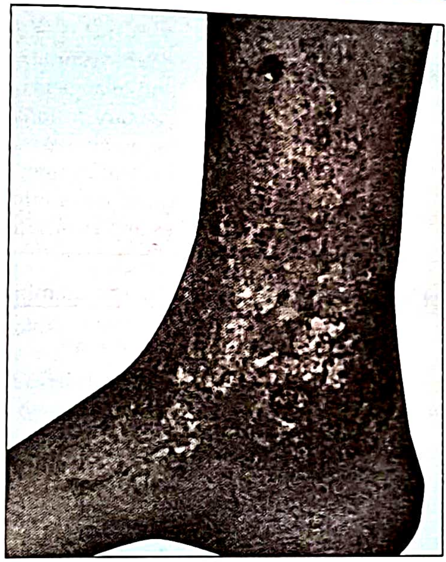


Fig 15.10: Image of ulcer, secondary lesion

Chapter Resources

1. Physical diagnosis – a textbook of symptoms and physical signs by Rustam Jal Vakil and Aspi F Golwalla, 13th Edition, MPP Pvt. Ltd, Mumbai, 2010
2. Chamberlain's symptoms and signs in clinical medicine by Colin Ogilvie & Christopher C Evan, 12th Edition, Butterworth Heinmann publications, New Delhi, 1997
3. A manual of clinical surgery by S Das, 4th Edition, Published by Dr S Das, Calcutta, 1998
4. Savill's system of clinical medicine revised & edited by E C Warner, 14th Edition, CBS Publishers, Delhi, 1998
5. The Merck's Manual by Robert S Porter & Justin L Kaplan, 19th Edition, Merck Sharp & Dohme Corp, 2011
6. Barbara Bates' a guide to clinical examination by Lynn S Bickley, 10th Edition, Lippincott publication, 2012
7. Website materials

Key points of the chapter

⇨ Dermatological examination is a challenging area where we gave ti determine normal from abnormal findings from the trivial onesand integrating pertinent signs and symptoms to appropriate differential diagnosis.

⇨ General medical history may be important because several multi-organ diseases first appear in the skin such as systemic lupus erythematosus. Special caution to be taken in getting the occupational history, information related to hobbies, environmental factors.

⇨ Physical examination of the skin is one of the easiest to perform. If we are not doing the examination of mucosal surfaces of buccal cavity, eyes, nose, nasopharynx and anogenital region, evaluation of dermatological illness will be incomplete.

- ⇨ Skin lesions are of two types – primary and secondary. Primary lesions are those which will be observed from the beginning of an illness. Macules, papules, vesicles, pustules, nodules, patch, tumour, plaques, bulla, wheal and telangiectasia are some examples of primary lesions. Secondary lesions will be manifested after the primary lesions. Lichenification, scale, crust, erosion, ulcer, excoriation, atrophy, scars are the examples of secondary lesions.

Probable questions may be asked in the examination

MCQs

1. Papules are the elevation from normal skin surface having a diameter of
   a. <0.1 mm;
   b. <0.5 mm;
   c. < 1 mm;
   d. > 0.5 mm
   Answer -(b)
2. Macule is a flat discoloured lesion having a diameter of
   a. < 1 mm;
   b. < 2 mm;
   c. < 3 mm;
   d. < 4 mm
   Answer -(b)
3. Find the one which does not belong to one group
   a. Telangiectasia;
   b. Wheal;
   c. Nodule;
   d. Ulcer
   Answer -(d)
4. Which of the following is not a primary lesion?
   a. Macule;
   b. Pustule;
   c. Crust;
   d. Patch
   Answer -(c)
5. Which of the following is a secondary lesion?
   a. Bulla;
   b. Plaque;
   c. Tumour;
   d. Excoriation
   Answer -(d)

***

16

Introduction To Laboratory Investigations

In the current era, whenever, we speak of the diagnosis of the diseases, accurate diagnosis of the diseases is incomplete in the absence of laboratory investigations. It does not negate the importance of history taking and physical examination. Otherwise, it will be just like searching the black coloured cat in dark room or searching crocodiles in the ocean or searching the way to move outside in the middle of the desert without having the compass with a person. Therefore, the wise clinician should take the history completely and after complete necessary physical examination, one should suggest the necessary laboratory investigations except in the emergency situations. If we suggest the laboratory investigations before history and physical examination, that may lead to unnecessary extra expenses and it may be a burden to the people especially who are coming from rural India or people of lower economical status.

When we speak of laboratory investigations, it can be categorized into 4 different sub headings.

- ⇨ Hematological investigations – in which blood sample of the individual is assessed. In this type of investigations, we are going to take the blood sample under aseptic precautions and is subjected to various investigations such as assessment of Hb%, total leucocyte count (TC), differential leucocyte count (DC), erythrocyte sedimentation rate (ESR), packed cell volume (PCV), bleeding time (BT), clotting time (CT) etc.
- ⇨ Urological investigations – in which urine sample of the individual is analysed. In this type of investigations, we are going to take the urine sample of the individual. In this type of investigations, it is further subcategorized into physical, chemical and microscopical examination.
  - ☐ In physical examination of urine, the physical characters such as volume of urine, colour of urine, odour, consistency of urine, sediment formation, reaction and pH, specific gravity urine are tested.
  - ☐ In chemical examination of urine, we are going to do test to detect the presence of suspended or dissolved particle in the urine sample such as glucose, protein, ketone bodies, hemoglobin, blood etc
  - ☐ In microscopical examination of urine, first we are going to centrifuge the urine sample and sediment of the sample is examined under the microscope for the presence of epithelial cells, pus cells, red blood cells, cast and crystals.
- ⇨ Serological investigations – in which serum of the individual is used to check the presence of antigen or antibody in the serum sample. For example, test of rheumatoid factor, anti strepto lysin O test, widal test etc.
- ⇨ Other investigations – include the laboratory evaluation of sputum, semen, cerebro spinal fluid (CSF), feces, biopsy, culture study of vaginal, nasal, oral swab etc. This is performed after detailed history and examination depending upon the clinical presentation.

Normal Laboratory Data Urine Analysis

⇨ Volume : 600-2,500 ml in 24 hours
⇨ Specific gravity : 1.002 – 1.025
⇨ Protein : < 150 mg/ day

⇨ Potassium : 25 – 100 mEq/ 24 hours
⇨ Sodium : 100 – 260 mEq/ 24 hours

Cellular components:

⇨ Epithelial cells : 3 – 5 cells/ HPF (High power focus)
⇨ RBC : 3 – 5 cells/HPF
⇨ Pus cells : Upto 5 cells/ HPF

Stool Analysis

⇨ Protein content : Nil
⇨ Stool nitrogen : < 1.7 g/ day
⇨ Fat : < 6 g/ day (measured on a 3 days stool collection-on a diet containing at least 50 gms of fat)

Hematological Parameters

⇨ **Hb concentration:**
  ☐ Males : 13 – 18 gm/ dl
  ☐ Females : 12 – 16 gm/ dl
⇨ **Haematocrit** : (PCV)
  ☐ Males : 0.42 – 0.52 (42-52%)
  ☐ Females : 0.37 – 0.48 (37-48%)
⇨ **RBC count:**
  ☐ Males : 4.1 – 4.9×106 cells/ cmm
  ☐ Females : 5.4 ×106 cells/ micro L
⇨ **Reticulocyte count:** (%) - < 2%
⇨ **Erythrocyte sedimentation rate (ESR):**
  ☐ Males : 0 – 15 mm in 1st hour
  ☐ Females : 0 – 20 mm in 1st hour
⇨ Mean corpuscular hemoglobin (MCH): 28 – 33 pg/ cell
⇨ Mean corpuscular hemoglobin concentration (MCHC): 32 – 36 g/dl
⇨ Total WBC count : 4,000 – 11,000 cells/ cmm
⇨ **Differential count:**
  ☐ Neutrophils : 40 – 75%
  ☐ Oesinophils : 0 – 7%
  ☐ Basophils : 0 – 2%
  ☐ Lymphocytes : 20 – 45%
  ☐ Monocytes : 4 – 10%
  ☐ Platelet count : 1.3 lakhs to 4 lakhs/ cmm
  ☐ Bleeding time : 2 – 8 minutes
  ☐ Prothrombin time: 10.5 to 14.5 seconds
⇨ Vitamin B12 : 200 – 600 pg/ ml
⇨ Serum folate : 3 – 16 ng/ ml of cells
⇨ Serum iron : 50 – 150 μg/ dl
⇨ Total iron binding capacity: 250–370 μg/dl
⇨ Ferritin : 150 – 400 ng/ ml

Chemical Constituents of Blood

⇨ Albumin : 3.5 – 5.5 g/ dl
⇨ Alkaline phosphatase : 40 – 125 U/L
⇨ Amylase : 60 – 180 U/L
⇨ AST and ALT : 0 – 35 U/L
⇨ Bicarbonate : 23 – 28 mmol/ lit
⇨ Total bilirubin : 0.3 – 1.0 mg/dl
  ☐ Direct : 0.1 – 0.3 mg/dl
  ☐ Indirect : 0.2 – 0.7 mg/dl
⇨ Calcium : 9 – 10.5 mg/ dl
⇨ Chloride : 98 – 106 mEq/L
⇨ Copper : 70 – 140 μg/L
⇨ Magnesium : 1.8 – 3 mg/ dl
⇨ Potassium : 3.5 – 5.0 mEq/L
⇨ Sodium : 136 – 145 mEq/ L
⇨ Uric acid : 2.5 – 8 mg/ dl
⇨ Urea : 10 – 20 mg/ dl
⇨ Creatinine : < 1.5 mg/ dl
⇨ **Cholesterol:**
  ☐ Total :< 200 mg/ dl
  ☐ LDL : < 130 mg/ dl
  ☐ HDL : > 60 mg/ dl
⇨ Triglycerides :< 160 mg/ dl
⇨ **Glucose:**
  ☐ Fasting (plasma : 70 – 110 mg/ dl (plasma)
  ☐ Post prandial blood : 140 mg/ dl (plasma)

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Colour Images

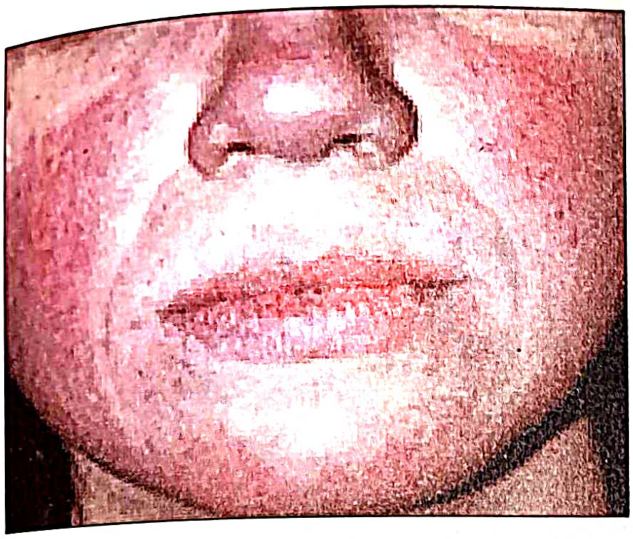

Fig 2.10: Image showing the reddish discolouration of the lips (Page 47)

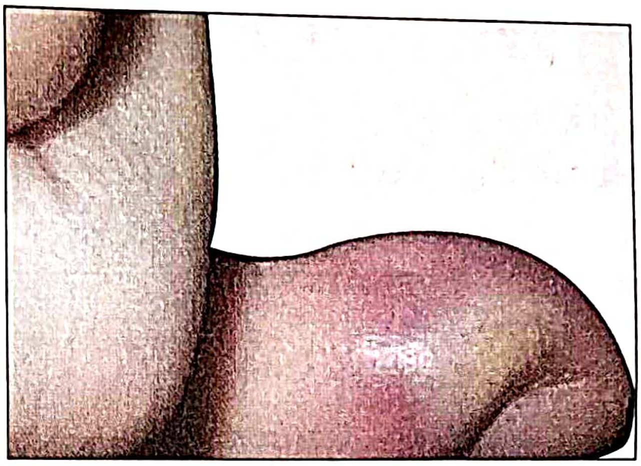

Fig 2.11: Image showing the pus accumulation in the finger (Page 47)

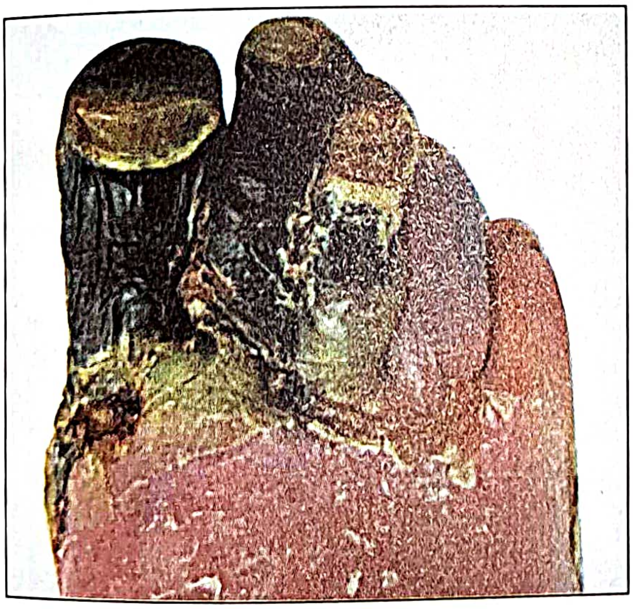

Fig 2.12: Image showing gangrenous changes in the toes of right lower limb (Page 48)

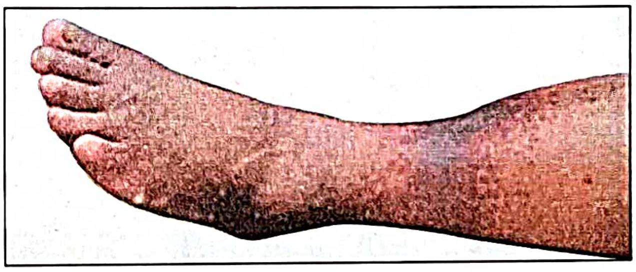

Fig 2.15: Karshnya (Vata Vriddhi) (Page 49)

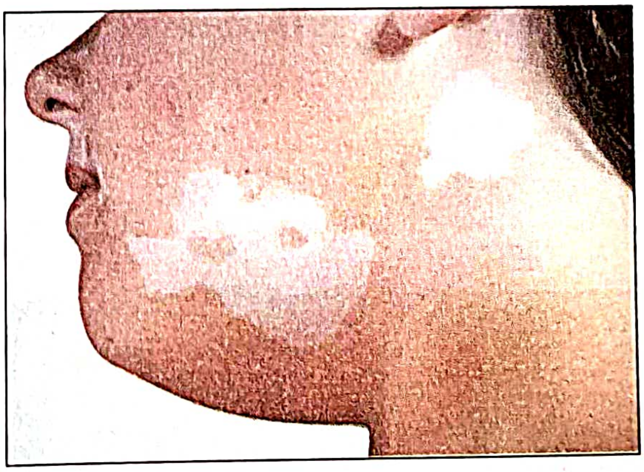

Fig 2.21: Whitish discolouration of the skin (Kapha Vriddhi) (Page 50)

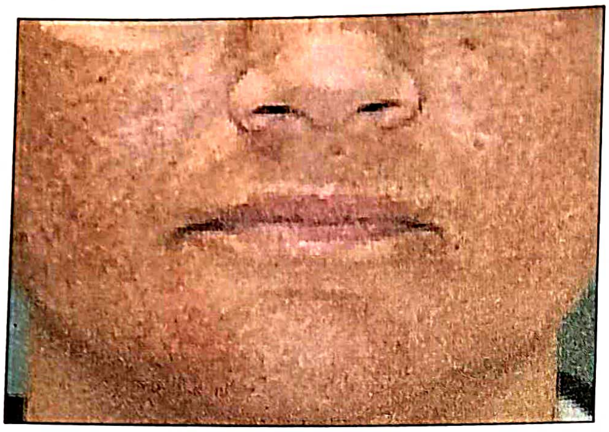

Fig 4.2: Rakta Vriddhi Few images (Page 75)

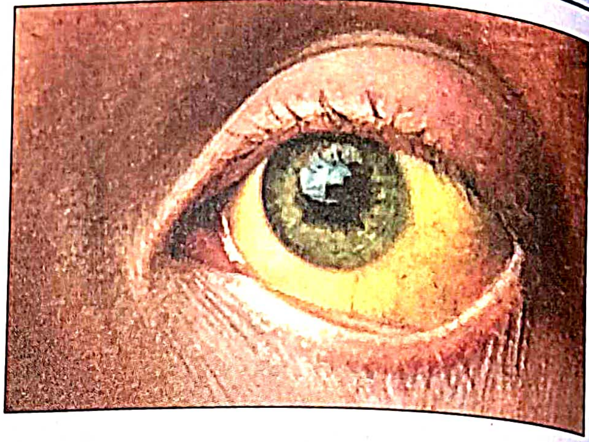

Fig 2.19: Yellowish discolouration (Pitta Vriddhi) (Page 50)

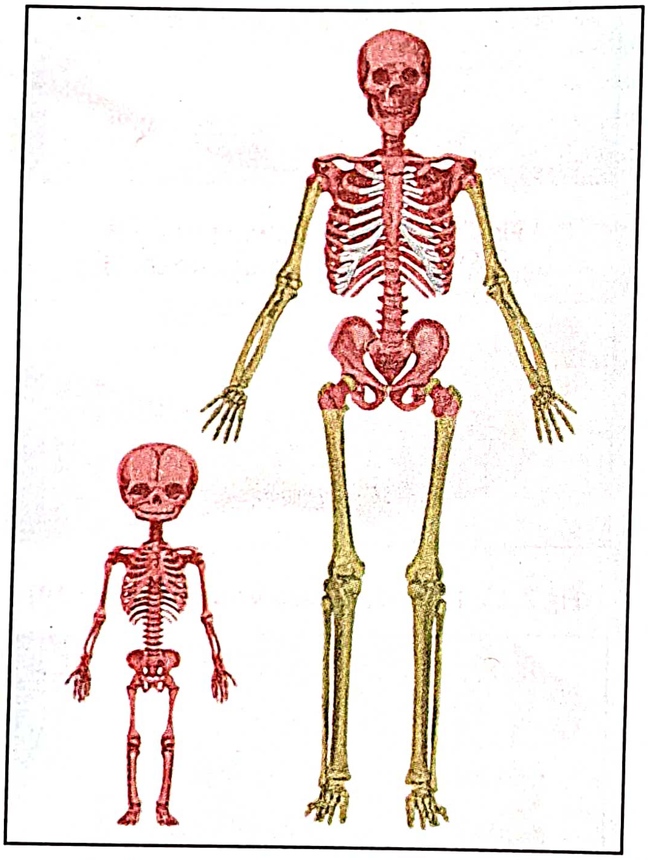

Fig 12.13: Bone Marrow (Page 164)

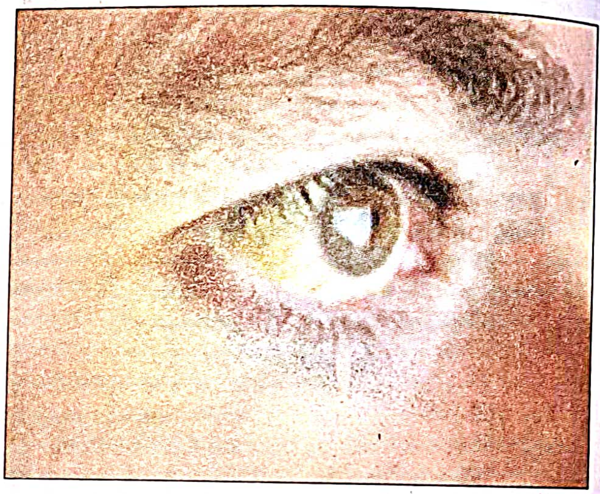

Fig 4.3: Rakta Vriddhi (Page 75)

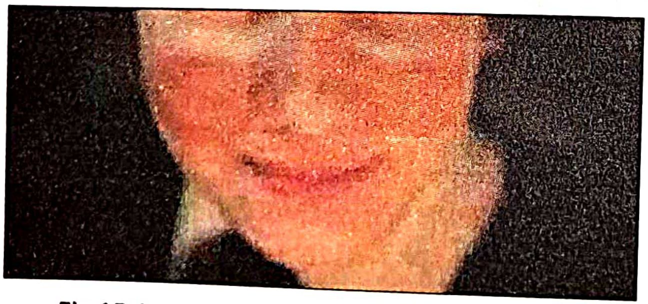

Fig 15.1: Image showing the butterfly rashes around the cheeks seen in the patient of SLE (Page 634)

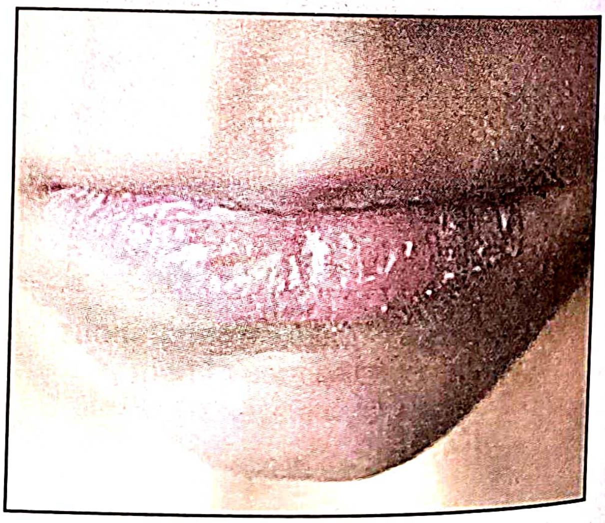

Fig 9.13: Dry and cracked lips (Page 545)